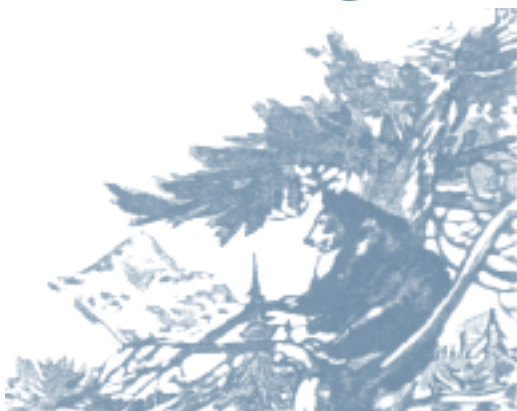


PART 3

Researchers and Resource Managers



PRESERVING THE BEASTS OF WASTE AND DESOLATION: THEODORE ROOSEVELT AND PREDATOR CONTROL IN YELLOWSTONE

Jeremy Johnston



THE EARLY HISTORY OF WILDLIFE MANAGEMENT in places like Yellowstone is often assumed to have been based on a consensus that predators such as wolves, coyotes, and mountain lions should be killed. Although President Theodore Roosevelt sought to curtail the slaughter of predators in Yellowstone in the early 1900s, his role in park policy is often misinterpreted, and he has been portrayed as both a hero and a villain. This confusion is the result of not only a divergence of opinions on predator control, but Roosevelt's own writings and changing views.

In his book *The Wilderness Hunter*, which detailed his experiences in the Dakota Badlands during the 1880s, Roosevelt referred to wolves as “the beasts of waste and desolation.”¹ In this same book, Roosevelt depicted cougars as “bloodthirsty” and “cowardly” predators with a “desire for bloodshed which they lack the courage to realize.”² Yet despite his depiction of predators as destroyers of cattle and wildlife, Roosevelt was a careful student of predators and their natural behavior. As he spent more time studying predators in their natural setting, his attitudes toward their role in nature began to change, so much so that by 1908 he ordered predator control of Yellowstone's cougars be stopped in order to allow these predator populations to curtail growing elk populations. This change in Roosevelt's perspective toward Yellowstone's predator population was influenced by several factors, including his goal of establishing a wildlife reserve in Yellowstone, his personal interest in hunting, and his increased understanding of the role of predators in an ecosystem.

Roosevelt's Defense of Yellowstone as a Wildlife Sanctuary

THEODORE ROOSEVELT'S INTEREST in natural history began at a very early age. At eight, young Roosevelt viewed a dead seal in a New York marketplace. “That seal filled me with every possible feeling of romance and adventure,” Roosevelt later reminisced.³ The young Roosevelt returned to the market to measure and weigh the seal. Eventually, he obtained the seal's skull, and began a natural history collection that would continue to grow throughout his life. In 1872, shortly after the creation

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of Yellowstone National Park, Theodore Roosevelt received a rifle and taxidermy lessons from his father for his birthday. These gifts would further his studies in natural history as well as introduce the young man to the sport of hunting. Roosevelt continued to pursue his natural history studies into his college years, when he initially sought a degree in natural history before deciding on law as a field of study. Despite this change in career goals, Roosevelt continued to study wildlife throughout his life.

Hunting would also play an important role in Theodore Roosevelt's life, not just for the collecting of natural specimens for study, but for recreational enjoyment as well. Roosevelt best summed up his feelings towards the sport of hunting in the preface to *The Wilderness Hunter*:

In hunting, the finding and killing of the game is after all but a part of the whole. The free, self-reliant, adventurous life, with its rugged and stalwart democracy; the wild surroundings, the grand beauty of the scenery, the chance to study the ways and habits of the woodland creatures—all these unite to give the career of the wilderness hunter its peculiar charm. The chase is among the best of all national pastimes; it cultivates that vigorous manliness for the lack of which in a nation, as in an individual, the possession of no other qualities can possibly atone.⁴

This great interest in hunting and natural history would eventually lead Roosevelt into the American West.

Roosevelt first visited the West in 1883, when he arrived for a bison hunt in the Dakota Badlands. After successfully completing his hunt, Roosevelt invested in a cattle ranch, marking the beginning of his close connection with the West. Roosevelt returned the next year to investigate his ranching operations and escape the grief and hardship caused by the deaths of both his first wife, Alice, and his mother. Roosevelt spent several of the following years herding cattle and having a number of adventures which included fighting drunken assailants and capturing thieves who stole his boat. Hunting also occupied a great amount of his time during these years. Roosevelt hunted a variety of animals throughout the Badlands and into Wyoming and Montana, and continued to spend much of his time at his ranch until the winter of 1886–1887 wiped out most of his cattle herd. In later years he occasionally returned to the ranch, using it as a base for hunting excursions and other sightseeing trips. From there, Roosevelt embarked on two trips into Yellowstone National Park in the 1890s. His experiences and observations from these trips formed the basis for many of his wildlife management policies in Yellowstone National Park.⁵

Roosevelt's interest in the American West soon focused on Yellowstone and the threats to its wildlife posed by railroad development proposals and poaching. He became aware of these problems in 1885 when he met with George Bird Grinnell, editor of *Forest and Stream*, then the leading natural history magazine in North America, and a founder of the Audubon Society. Grinnell had led a campaign to protect Yellowstone's ungulates from market hunting and commercial development ever since his first visit to Yellowstone in 1875. Roosevelt wanted Grinnell to explain some negative remarks he printed in a review of *Hunting Trips of a Ranchman*, Roosevelt's first book describing his western adventures. Grinnell had given the

book an overall favorable review, but noted that Roosevelt tended to generalize his observations of wildlife and had relied on some tenuous sources for information. During the meeting, Grinnell defended his remarks pertaining to Roosevelt's book and Roosevelt realized the validity of Grinnell's arguments. Along the way, the two men realized their shared interests in hunting and the West and became good friends. Soon after, they founded the Boone and Crockett Club, an organization that, among other goals, worked to defend Yellowstone and its wildlife. Using *Forest and Stream* as its mouthpiece, the Boone and Crockett Club criticized poaching and proposals for railroad developments within Yellowstone. This publicity helped result in the passage of the Lacey Act of 1894, which established Yellowstone's first efficient judicial system, making it possible to punish poachers for their illegal activities. The Boone and Crockett Club also stopped efforts to complete a railroad through the northern section of Yellowstone. When railroad developers wanted to decrease the park's boundaries, publicity generated by the Boone and Crockett Club created a public outcry to "save Yellowstone."⁶

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as settlement increased, the West would become a series of private game reserves creating a situation where only the rich could hunt. As his political career progressed to the presidency of the United States, Roosevelt found himself in a position where he could achieve these goals by micro-managing Yellowstone's wildlife policies.

Roosevelt and Yellowstone's Predators

ALTHOUGH THE HUNTING of many ungulate species ended in 1883 by a directive of the Secretary of the Interior, park officials continued killing predators throughout the end of the nineteenth century and into the early twentieth century. Many conservationists of the day, including Roosevelt, believed limiting predation would increase ungulate populations, allowing them to recover from the results of the intensive market hunting that occurred in the park before the ban on hunting.⁷

Roosevelt's support of predator control was not just the result of an altruistic conservationist urge. His own desire to hunt cougars in Yellowstone was also a factor. On December 17, 1901, Roosevelt wrote to Yellowstone's acting superintendent, Major John Pitcher, asking "what is the practice about killing mountain lions? If I get into the Park next June I should greatly like to have a hunt after some of them—that is, on the supposition that they are 'varmint' and are not protected."⁸ Going on a cougar hunt in Yellowstone also would provide Roosevelt with an opportunity for him to get reacquainted with his friend and hunting guide, John B. Goff.

Hunting Mountain Lions

ROOSEVELT HAD FIRST MET JOHN B. GOFF in January 1901. Shortly after Roosevelt was elected vice president, Goff guided him on his first cougar hunt using hounds, in Colorado. Although cougars greatly interested Roosevelt, he had seen very few of them in wild. His knowledge of the animal had come mostly from the tales of outdoorsmen he met in the Badlands.⁹

During his hunt with Goff, Roosevelt thoroughly enjoyed himself and learned much about cougars.



After leaving his position in Yellowstone, Goff continued to hunt cougars in the Shoshone National Forest, east of Yellowstone National Park's boundary, where he was photographed circa 1907 with his dogs and a recent kill. Photo courtesy of the Park County, Wyoming, Historical Archives.

Fourteen cougars were killed during the trip, twelve of them by Roosevelt alone. If this sounds like senseless slaughter, it should be remembered that in a time before high-tech film and advanced scientific methods were used to study wild animals, hunting was one of the only available ways to closely examine wildlife. Roosevelt's narrative of the hunt, found in *Outdoor Pastimes of an American Hunter*, published in 1905, was "the first reasonably full and trustworthy life history of the cougar as regards its most essential details."¹⁰ Clinton Hart Merriam, director of the Division of Biological Survey, agreed with Roosevelt. After receiving cougar skulls from the hunt, he wrote Roosevelt that "your series of skulls from Colorado is incomparably the largest, most complete, and most valuable series ever brought together from any single locality, and will be of inestimable value in determining the amount of individual variation."¹¹ The 1901 hunt not only provided specimens for classification; Roosevelt gained a better understanding of the predation habits of cougars, learned about their diet by examining stomach contents, and dispelled the myth of cougars being man-killers. This information formed the basis for Roosevelt's decisions regarding predator control in Yellowstone.¹²

Roosevelt planned to return to Colorado for a second hunt with Goff for bear in 1903, but his plans never came to fruition. Philip B. Stewart from Colorado Springs, a close friend who had accompanied Roosevelt on the 1901 cougar hunt, took on the task of organizing the hunt, but one obstacle after another confounded his plans. First, Goff was wounded by an over-eager tourist he was guiding on a hunt. Roosevelt expressed his frustration to Stewart in a letter, "I hope he beat the 'tourist' who inflicted the wound severely."¹³ Goff recovered rapidly, and promised enough cougar to keep Roosevelt satisfied, but on January 22, 1903, Roosevelt wrote Stewart to cancel the hunt. "Many things are conspiring to make it unlikely that I can go," he complained.¹⁴ Instead, Roosevelt scheduled a grand tour of the western states for the spring of 1903, with one stop at Yellowstone.

Roosevelt continued hoping for another hunt with Goff. Shortly after canceling the hunt in Colorado, Roosevelt wrote Stewart about the possibility of sending Goff from Colorado to meet him in Yellowstone. By bringing Goff to Yellowstone, Roosevelt would be able to meet two objectives: controlling predators within the park and enjoying a hunt. "The park authorities say they would like Johnny Goff to be up there with his dogs on trial for the business of killing out some of the mountain lions," Roosevelt wrote to Stewart, "then if things went right, I might get a week with him myself."¹⁵ But his plan began to unravel when Secretary of War Elihu Root noted that Roosevelt's public image might be tarnished if he killed any animals within the park.¹⁶ Root most likely felt that a hunt in Yellowstone National Park, where hunting by the general public was forbidden, would appear to be self-serving, and no less than a misuse of presidential authority. If the public got wind of Roosevelt ordering his hunting guide to Yellowstone, it could create a minor scandal.

Roosevelt attempted to resolve the issue by writing Major John Pitcher, "Secretary Root is afraid that a false impression might get out if I killed anything in the Park, even though it was killed, as of course would be the case, strictly under Park regulations...Now I have thought of this: Would it be possible, starting from within the Park, to go just outside the border and kill any mountain lions?"¹⁷ Roosevelt



President Theodore Roosevelt (left) in camp near Tower, Yellowstone National Park, with John Burroughs (right), April 1903. NPS photo.

then requested Pitcher to send out scouts to find a suitable area, and concluded the letter by asking if he had requested any hounds for the purpose of killing predators.¹⁸ Roosevelt wanted to be sure that if Goff could not reach Yellowstone for some reason, he would still be able to hunt cougars outside of the park boundaries by using the government's pack of dogs. Pitcher's response is not known, but it appears he did submit an application for three hounds. Roosevelt ordered Secretary of the Interior Ethan Hitchcock to send Pitcher an additional three dogs to supplement the pack. On March 2, Roosevelt ordered Pitcher to put the dogs through a trial run. "We must be dead sure we get our mountain lion," noted Roosevelt.¹⁹

Pitcher wrote a report to the president on the hunting possibilities, noting that his scouts had located "the fresh tracks of ten mountain lions, close to the point where we propose to make our camp."²⁰ He also noted that the park's buffalo keeper, C. J. "Buffalo" Jones, had captured a live lion while feeding some bighorn sheep in the area. Pitcher reported that the dogs would soon arrive in the park from Texas, and that kennels awaited them. Perhaps trying to alleviate the president's fears about public opinion, Pitcher wrote, "Now these lions have simply got to be thinned out, and if you will lend us a hand in the matter, you will be of great help to us and no one can offer any reasonable objection to your doing so."²¹

With Pitcher's assistance, Roosevelt eagerly anticipated his trip to Yellowstone, with a side-trip outside the park to kill some cougars. Roosevelt's plans took another turn on March 21, however, when Pitcher informed the president that only four of the eight dogs had arrived, and they were untrained. Buffalo Jones was attempting to train them using his captured cougar. Pitcher also noted that he had telegraphed Mr.

Poole, the dog supplier, and informed him that he needed the other four dogs, two of which must be trained or else the contract would be voided. Poole telegraphed back that four more dogs were being shipped to the park. Pitcher requested John Goff's address in order to contact him if the four new dogs were unsuitable.²²

Upon learning of the problem with the dogs, Roosevelt wrote back to Pitcher to cancel the hunt and comment, "Having had experience in the past with individuals who sold hounds, I am not in the least surprised at your news."²³ Roosevelt wrote that "an untrained hound is worse than useless. Such a pack will run deer or elk in the place of lion, and will be a perfect curse to the Park."²⁴ He also noted that bringing Goff up to the park would be unacceptable. "The more I have thought it over...[Goff] coming up would cause a great deal of talk."²⁵ He concluded the letter by noting that seeing the game of the park would be exciting enough but that, on the off chance the hounds were trained in time, he would attempt to hunt cougar.²⁶

On April 8, 1903, Theodore Roosevelt arrived in Yellowstone National Park for his long anticipated visit. Famed naturalist and writer John Burroughs accompanied Roosevelt during his visit, which lasted for over two weeks. During this time, Roosevelt and Burroughs spent most of their time studying the park's wildlife. Roosevelt fired only one shot within the park. Using a tree for a target, he tested a new revolver, only to have the spent shell fly back, cutting his cheek. The only animal Roosevelt killed during his trip was one mouse. With hope of discovering a new species of mice, Roosevelt caught his prey by throwing his hat over the mouse to entrap the small creature. He spent the evening skinning the mouse and treating the small pelt for shipment to the U.S. Biological Survey to see if it was a new species. It was not, but was a species previously unknown to the park area. John Burroughs worried newspapers might misprint the word "mouse" in their articles as "moose" and create a controversy for the president.²⁷

Roosevelt's preparations for a cougar hunt came back to haunt him during his visit. Buffalo Jones decided to take matters into his own hands by bringing the government's pack of hounds to the presidential camp for a quick cougar hunt. Upon Jones' arrival at the camp, Roosevelt instructed Pitcher to order Jones and the hounds back to Mammoth Hot Springs. John W. Meldrum, the judge of Yellowstone's court who tried to warn Jones not to bother the president, later recalled, "I met [Jones] down at the Post Office shortly after he came in and said, 'Hello Jones, I thought you were out with the President.' Jones was so mad that he never said a word."²⁸

Predator Control in Yellowstone

DURING THE PRESIDENT'S VISIT in April 1903, he had substantial time to study Yellowstone's wildlife. His perspective on predators began to change, especially after he witnessed the conditions of the elk herds. He saw many elk along the way to his campsite on the Yellowstone River near the Black Canyon of the Yellowstone, and noted that they "were certainly more numerous than when I was last through the Park twelve years before."²⁹ With the help of Pitcher and their guide Elwood Hofer, who had also guided Roosevelt during his 1891 visit to the Yellowstone area, Roosevelt counted 3,000 head of elk in one sitting. He also noticed many elk carcasses lying

on the ground. He paid close attention to what had caused their deaths. Two were killed by “scab,” and some by cougars, but most had died of starvation—the result, Roosevelt believed, of overpopulation. Roosevelt assumed the numbers to be too high on the basis of what he had witnessed during his visits in 1890 and 1891. Certainly, the elk numbers would have increased throughout the 1890s due to the cessation of market hunting within Yellowstone and increased power to prosecute poachers under the Lacey Act. In addition to decreased hunting, the destruction of the wolves and other natural predators in this time period would have decreased predation, allowing for a greater increase in elk numbers.

Roosevelt now began to defend the cougars’ presence in the park: “As the elk were evidently rather too numerous for the feed,” he later wrote in the account of his trip, “I do not think the cougars were doing any damage.”³⁰ Roosevelt began to worry that the elk herds would meet the same fate as his North Dakota cattle herds had in the disastrous winter of 1886–1887; that they would deplete the range, leaving little if any winter feed, and leading to starvation for themselves and other wildlife. To prevent this from occurring, Roosevelt believed the elk herds needed to be thinned down, and that predators were needed to fulfill this function in place of human hunters. Roosevelt now realized that predators such as cougars were an important part of the Yellowstone ecosystem. This was a rare opinion for the time period, especially from a former western rancher. Roosevelt believed the winter die-offs were an effective method of population control of elk numbers, but he considered it to be too inhumane. Instead, his background in range management focused him on establishing a balance between elk numbers and what he considered to be efficient feed on the range.

Although Roosevelt wrongly believed that cougars alone could keep down the elk numbers, he still feared that cougar predation would destroy other wildlife populations such as deer and bighorn sheep. He worried most about cougars because he thought coyotes and wolves were not as dangerous to the ungulate herds. By that time, wolves would have been too low in numbers to have had much of an impact on the ungulate herds, and Roosevelt dismissed coyotes as formidable predators. “Although there are plenty of coyotes in the Park, there are no big wolves,” he noted, “and save for very infrequent poachers the



“Head of Cougar Shot Sept., 1889” by J. Carter Beard, from Roosevelt’s The Wilderness Hunter. This illustration shows how mountain lions were depicted in the past—as bloodthirsty killers.



only enemy of...all game, is the cougar.”³¹ Based on this belief, Roosevelt began to advocate a limited predator control program for the cougar population. Major Pitcher assigned Buffalo Jones the responsibility for controlling cougars with the government’s new hounds. However, Jones soon ran into a conflict with park military officials and resigned his position. When notified of Jones’s resignation, Roosevelt knew just the man for the job—his former hunting guide, John B. Goff.

In the spring of 1905, during a bear hunt with Goff, Roosevelt wrote to Major Pitcher; A. A. Anderson, the Yellowstone Forest Reserve inspector; and Ethan A. Hitchcock, Secretary of the Interior, requesting that Goff be “given all the privileges that can be given for killing lion within or without the park.”³² Goff left for Yellowstone in June, expecting the job of thinning out the Yellowstone cougar population to take four years.³³

Roosevelt’s instructions to Goff indicated his newly selective approach to predator control. “Of course you can not afford to let the cougar exist in the neighborhood of where the deer and sheep are,” Roosevelt wrote Goff in May 1906, “but any cougar that are found off where there are practically nothing but elk, I should think it a good plan to leave them alone.”³⁴ Unfortunately, Roosevelt failed to realize that after years of steady hunting, Yellowstone’s cougar population had already been fairly well exterminated. Goff’s son Byron later recalled, “Roosevelt was misinformed about the lion situation.”³⁵ John Goff soon discovered that few cougars existed in the park, and he resigned after less than a year of service.

Shortly before Goff left the park, Roosevelt began to realize that the cougar population had become dangerously low. After receiving a letter from Goff, Roosevelt responded, “I am sorry to hear about the elk having had such a bad winter, but just as I have said, there are so many elk that they have begun to be too plentiful in

the park, and personally I should be sorry to see all the cougar killed off.”³⁶ These fears regarding the rising elk populations and loss of predator populations caused Roosevelt to rescind his predator control policies against the cougar populations. In a 1908 letter to Superintendent S. B. M. Young, Major Pitcher’s replacement, Roosevelt ordered an end to the killing of cougars in the park:

I do not think any more cougars should be killed in the park. Game is abundant. We want to profit by what has happened in the English preserves, where it proved to be bad for the grouse itself to kill off all the peregrine falcons and all the other birds of prey. It may be advisable, in case the ranks of the deer and antelope right around the Springs should be too heavily killed out, to kill some cougars there, but in the rest of the park I certainly would not kill any of them. On the contrary, they ought to be let alone.³⁷

Although hundreds of coyotes continued to be killed while Roosevelt was in office, cougars were left alone in Yellowstone after his directive was received. The pack of dogs purchased by the government under Roosevelt’s directions was sold. The official killing of cougars did not resume until 1914, when 14 were killed. After the National Park Service assumed control over Yellowstone National Park, cougars continued to be killed: four in 1916; a total of thirty-four in years 1918 and 1919. The last reported official killing of a cougar in Yellowstone occurred in 1925.³⁸

Too Many Elk in Yellowstone?

IN 1912, ROOSEVELT’S ATTENTION again focused on Yellowstone. In an article to *Outlook* magazine, Roosevelt publicly voiced his concern over the increasing number of elk in the park. He had previously expressed worry regarding the park’s elk numbers, but now feared that the problem would result in disaster. Roosevelt predicted the following:

Elk are hardy animals and prolific. It is probable that a herd under favorable conditions in its own habitat will double in numbers about every four years. There are now in the Yellowstone Park probably thirty thousand elk. A very few moments’ thought ought to show any one that under these circumstances, if nothing interfered to check the increase, elk would be as plentiful as cattle throughout the whole United States inside half a century. But their possible range is of course strictly limited, and as there are no foes to kill them down, the necessary death-rate is kept up by nature in far more cruel way—that is starvation by winter. The suffering and misery that this means is quite heartrending...What is needed is recognition of the simple fact that the elk will always multiply beyond their means of subsistence, and if their numbers are not reduced in some other way they will be reduced by starvation and disease.³⁹

The only solution, Roosevelt decided, was that “it would be infinitely better for the elk, infinitely less cruel, if some method could be devised by which hunting them should be permitted right up to the point of killing each year on an average what



TR on Officer's Row at Fort Yellowstone, 1903. NPS photo archives.

would amount to the whole animal increase...Of course the regulation should be so strict and intelligent as to enable all killing to be stopped the moment it was found to be in any way excessive or detrimental.”⁴⁰

A number of obstacles prevented the implementation of Roosevelt's proposal for controlling the numbers of elk in Yellowstone by limited hunting. It was hard to convince the public and the military administrators in Yellowstone that the elk herds should be culled. Park administrators did attempt to solve the problem by increasing the feeding of hay to elk, decreasing domestic grazing in the National Forest Reserves, and by shipping elk outside the park, but this was not effective in Roosevelt's opinion.⁴¹ Roosevelt criticized these methods: “from time to time well-meaning people propose that the difficulty shall be met by feeding the elk hay in winter or by increasing the size of the winter grounds...But as a permanent way of meeting the difficulty neither enlarging the range nor feeding with hay would be of the slightest use. All that either method could accomplish would be to remove the difficulty for two or three years until the elk had time to multiply beyond once more to the danger-point.”⁴²

Misleading publicity regarding the elk die-off in the winter of 1916–1917 seemed to confirm Roosevelt's worst fears. This news led many people to believe

the winter had killed off most of the park's elk population. Heavy snowfall kept the elk herds from traveling to their winter range. Many elk died from starvation, which preservationists took as proof that overpopulation was threatening the future of the elk. Some people became alarmed that the species that barely survived the era of market hunting was again headed for extinction, this time from natural forces. Most of this fear was based on exaggerated counts from previous years, but the park's new administration, the National Park Service, responded by continuing the policy of feeding hay to the elk. Roosevelt felt this would only continue to compound the problem by once again raising the elk population to uncontrollable standards.⁴³ Predator control of wolves and coyotes continued as the newly established National Park Service assumed the management of Yellowstone National Park. The new managers also targeted the cougar populations once again. In 1916, 4 cougars, 180 coyotes, and 14 wolves were killed. The following year, 100 coyotes and 36 wolves were killed. In 1918, 23 cougars, 190 coyotes, and 36 wolves were killed.⁴⁴

In 1918, Roosevelt wrote to his friend George Bird Grinnell to express his concerns for the future of Yellowstone:

The simple fact is that if we got additional winter grazing grounds for the elk, or fed them alfalfa, in four years they would have multiplied beyond the limit again, and we should be faced by exactly the same difficulty that we are now. There is winter ground for a few thousand elk in the park but not much more than a fraction of the present number. As their natural enemies have been removed their numbers must be kept down by disease or starvation or else by shooting. It is a mere question of mathematics to show that if protected as they have been in the park they would, inside of a century, fill the whole United States; so that they would then die of starvation!⁴⁵

The next year, the National Park Service killed 11 more cougars, 227 coyotes, and 6 wolves. Predator control continued to remove what "natural enemies" of the elk were left. Former Yellowstone superintendent and National Park Service Director Horace Albright later described the reason for this policy: "the rangers have grown to love all wild life except those predatory species which they so often observe destroying young antelope, deer, or elk. Aside from those outlawed animals, a national park ranger is never known to kill a native animal or bird of the park, or to express a desire to kill."⁴⁶ The issues raised by Roosevelt regarding elk numbers and the role of predators have continued to be debated by the National Park Service into the twenty-first century. Eventually, the National Park Service used controlled hunting to maintain elk numbers at certain levels. This ended in the 1960s when bad publicity and evolving scientific theories of density dependence led to the adoption of natural regulation policies. Attitudes toward Yellowstone's predators also changed. Many scientists began to realize the important role of wolves, coyotes, and cougars in the Yellowstone ecosystem. In 1935, the National Park Service ended predator control.⁴⁷

In 1919, Roosevelt passed away at his home at Sagamore Hill, New York. With his death, Yellowstone lost not only one of its most important defenders, but also one of its early wildlife managers. Roosevelt's handling of predators in Yellowstone

will always be debated as having been good or bad. Yet one thing is clear: Roosevelt attempted to establish policies that he believed were in the park's best interest as he understood it at the time. Unfortunately, he did not understand many of the environmental changes that were occurring in Yellowstone, nor did he recognize how drastically the environment had been changed by those before him, especially how much damage had been done to the predator populations. He also believed that the natural increase of the elk populations and the effects of winter kills, which are now recognized as part of the natural process in Yellowstone's ecosystem, were inhumane and needed to be managed with what he viewed as more humane methods. Despite these shortcomings, Roosevelt's changes to Yellowstone's predator control policies were fairly advanced for his day and age. Roosevelt must be given credit for his effort to look beyond the image of predators as "beasts of waste and desolation" to critically examine their valuable role in the Yellowstone ecosystem.

I would like to thank Lee Whittlesey and Paul Schullery for their assistance in my research for this article.

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A DELICATE BALANCE: FRONT AND BACKCOUNTRY MANAGEMENT OF YELLOWSTONE'S CULTURAL RESOURCES

Laura Joss and Tom Olliff



Introduction

THIS PAPER REPRESENTS THE RESULTS OF THREE YEARS of our working together to address the coordination of cultural resource management and planning among diverse programs in the front and backcountry of a 2.2 million acre resource with up to 800 staff. This presentation attempts to represent some of the perspectives of both field rangers and headquarters-based resource managers. Examples of the creative resolution of conflicts and successes, which have been possible due to cooperation and applying the expertise each group brings, will be discussed. These examples may serve as models for resource management programs in other parks and heritage areas.

Cultural Resources Management Challenges and Conflicts

IN YELLOWSTONE, PROBABLY LIKE MANY OTHER PARKS, it often seems that our cultural mandates are at odds with our mandates regarding natural resources and wilderness values. The National Historic Preservation Act (NHPA) was signed in 1966; however, it didn't become a reality for the staff at Yellowstone until the late 1980s. Even as recently as 3½ years ago (1984), the majority of NHPA related inventory, evaluation, and compliance in Yellowstone was either being done or overseen by just one individual, the cultural resource specialist. Due to lack of subject matter experts in the park, most inventory projects had to be done by contract or National Park Service (NPS) regional office staff. One exception was the park's Concessions Division, which took responsibility for the majority of their required inventory, documentation, and compliance. For other divisions, the lack of cultural resource inventories and subject matter experts (or money to contract for them) resulted in frustration in the lengthy process required before most projects could move forward. In a few cases, this frustration combined with the park's short backcountry working season led to the temptation to move forward on projects without completing the necessary compliance. The park has attempted to correct this situation through four steps: (1) the creation of the Branch of Cultural Resources in 1994, (2) re-engineering of the internal NHPA compliance process, (3) cultural resource management training, and (4) improved communication and cooperation among front and backcountry staff in all divisions.

The following examples are projects which illustrate the results of these changes, and show some of the benefits (such as enhanced resource protection and savings of staff time and funding) of this new cooperative process. In a resource as large as Yellowstone, backcountry rangers become the eyes and ears for the rest of the park staff. They monitor changing conditions and threats to resources, and they often initiate requests to perform preservation maintenance work. This is particularly true for historic cabins.

Preserving Historic Cabins

THE THIRTY-NINE HISTORIC BACKCOUNTRY PATROL CABINS, barns, and lookouts used by Yellowstone rangers today are direct descendants of the original “snowshoe” cabins built by the U.S. Army beginning in 1890. The patrol cabins are still used for the same purpose the military used them for—to protect park resources. The current cabins were built during the first half of the twentieth century, ranging from 1912 to 1944. They were placed approximately ten miles, or a day’s ride, apart to form a patrol network. Patrols were dispatched to remote areas in the park to counter the illegal skin hunters, tooth hunters, fur trappers, and head hunters. While today’s backcountry cabin mimics earlier cabins in style and function, the details have changed as technology improves. The most significant change for many of the cabins is the conversion from a sod roof. Most of the cabins built prior to 1925, including Buffalo Lake, South Riverside, Harebell, Fox Creek, and Thorofare, were constructed with a sod roof. All sod roofs were replaced by 1941. Other changes improved the “livability” of the cabin: dirt floors were replaced with wood or concrete, porches



Figure 1. Crevice Mountain Cabin (Yellowstone National Park Slide File #15,021).



Figure 2. Backcountry cabin interior (Yellowstone National Park Branch of Cultural Resources slide collection).

were added or improved, barns or sheds were built, and foundations were replaced or improved. Much of this work was done in the historic period; some of it was completed in more recent years. None of the cabins have remained static over the years.

Historic Furnishings in Cabins. Some cabins still contain the original stoves and furniture that were installed when the cabins were first put into use. These items are an important part of the cabin's interior appearance and history. The interiors are being documented as part of a current parkwide historic structures inventory, and the park curator is working to document original furnishings in situ.

Development of the Preservation Maintenance Program. Between when the first extant cabin was built, in 1912, until about 1980, maintenance was done primarily by crews of rangers with some carpentry experience. During this period, work was done to maintain or improve the structure. Little thought was given to maintaining the cultural integrity of the structure. Few records were kept of this work. What records are available appear in cabin logbooks, ranger reports, or in photos in the archives.

In 1983, the park contracted with a historic architect to inspect eleven backcountry cabins and recommend treatment. He also taught a preservation maintenance course to the park's burgeoning preservation maintenance crew, restoring the Crevice Mountain Cabin, built in 1921, in the process. Since that time, the preservation maintenance crew has restored nine structures. All work is done in compliance with the Secretary's Standards.

Difficulties of Working in Remote Conditions. Working in a remote setting for an extended period of time presents its own particular logistical problems. Since sites are in remote locations, helicopters deliver the materials, tools, and camp setup, but the crew has to walk or ride in. Helicopter time is the primary cost associated with preservation maintenance of backcountry structures. In the summer of 1997, the Buffalo Lake Cabin was restored. Materials cost \$3,000, labor \$14,000, and flight time \$23,000 (all costs are approximate).

Compliance. One of the best ways to stretch the park's cultural resources staff is to have them train other staff to initiate cultural compliance such as inventories. This is especially critical in backcountry situations when traveling to a site may take several days and the on-site work may take a few hours. Yellowstone's cabins are being included in the parkwide historic structures inventory and evaluation project. As part of this project, in the summer of 1997, resource management staff and backcountry rangers were trained by National Park Service system support office staff to complete the historic buildings inventory form for backcountry cabins.

Re-engineering. This example of cooperation between resource management staff and backcountry rangers is part of the park's effort to improve our cultural resource compliance process. In 1996, the park's branch of cultural resources initiated a re-engineering of our internal NHPA Section 106 and 110 procedures. The results were two dramatically streamlined processes. The Section 106 process was reduced from thirty-one steps to five, and the Section 110 process from fourteen steps to seven. Under the new process, when a division has a project to address, it can begin the research to assess the cultural value of a site in consultation with the park's cultural resources specialist and subject matter experts. Park staff met with both the Wyoming and Montana state historic preservation officers to review the new process and made changes based on their recommendations.

This new process has already speeded up projects, but relies on park staff to gain the training they need about the National Historic Preservation Act, initiate the process in a timely manner, consult with park cultural resources staff, and bring in subject matter experts for the required professional inventories, evaluations, and reporting.

While working within this re-engineered system, there will always be projects which require extra cooperation and consideration among park staff. This is especially true for projects which have the potential to affect both cultural and natural resources. Some examples of such projects follow.

Preserving Cultural Landscapes

AN OFTEN OVERLOOKED CULTURAL RESOURCE is the cultural landscape. One can sit on the porch of most backcountry cabins and gaze out on the same scene that a cavalry officer gazed on 80 years ago: pristine mountain lakes and streams, towering peaks, lodgepole pine forest bisected by grassy meadows. The only element that is out of place is the modern invasion of noxious weeds.



Figure 3. Heart Lake Cabin (Yellowstone National Park slide collection).

In 1989, the Snake River resources staff discovered a large patch of Canada thistle (a noxious weed prevalent throughout the backcountry) near the front porch of the Heart Lake Cabin, which was built in 1923. Except for a few trees that have died in the subsequent years, the cultural landscape at Heart Lake looks the same as it did in 1923.

After the Canada thistle was discovered, the Heart Lake ranger began to control it through repeated mowings. While the patch has not been completely removed, the plants are stunted and consequently shorter than the native grasses and forbs in the area. The result is preservation of the cultural landscape of the Heart Lake Cabin area.

Cultural Resources Versus Natural Resources

Opal Terrace Versus the Executive House. A unique conflict between cultural and natural resource preservation has arisen in the park's Fort Yellowstone-Mammoth Hot Springs Historic District. The Executive House, a concessioner-occupied dwelling, is periodically threatened by the encroachment of the Opal Terrace geothermal feature. A Robert Reamer building, the Executive House was built in 1908. In the past, the Opal Terrace runoff covered the tennis courts adjacent to the house, and as the feature continues its natural flow, there is increasing potential for damage to occur to the historic structure as well as a possible threat to the safety of the building residents.

Park staff from a variety of divisions have worked together to resolve the conflict. The group's preferred alternative will protect the Executive House through minimal



Figure 4. Executive House and Opal Terrace thermal feature, 2004 (Yellowstone National Park Branch of Cultural Resources slide collection).

diversion of the thermal flow. Recommendations were also made for handicap accessible boardwalks, a viewing deck and interpretive exhibits that would explain the cultural/natural resource conflict presented to park management.

Cultural Mandates Versus Wilderness Mandates. Wilderness is a place “untrammeled by man.” However, over a century of use has left its impact on Yellowstone’s backcountry: trash piles left from old camps, hotels, dumps, and construction work; miles of telephone wires and piles of insulators; rusted wire fencing; and old foundations and poacher’s cabins. All in all, the impulse of many wilderness managers is to “clean up” this so-called “trash.” It would appear that the mandates of the wilderness act, and of NPS Wilderness Management Policy are in conflict with the NHPA.

The real problem is that many wilderness managers do not have the wherewithal to properly evaluate these potential historic properties and separate the trash from the treasure.

Park cultural resources staff are working with resource managers and rangers to identify, map, inventory, and document such sites. The park curator also works with staff to determine which materials are important for inclusion in the museum collection. This is also being done in the front country when artifacts are found in the walls, floors, and attics of historic structures as they are being rehabilitated.



Figure 5. Historic archeological site with early visitor refuse (Yellowstone National Park Branch of Cultural Resources slide collection).

Preserving Prehistoric Cultural Resources

Archeology Versus Modern Campsites. A good campsite is a good campsite—water, cover, view, access; we use the same campsites today that have been used for almost 10,000 years. Often, our campsites do not meet our minimum resource regulations: they are too close to the trail, too close to water [36 CFR 2.10 (3)], and it is impossible for campers to separate cooking and sleeping areas. We are in the process of trying to move many of our campsites to meet the requirements.

Our efforts to meet our backcountry requirements were stymied for several years because we could not complete archeological evaluations of the proposed new campsites and trails. Wilderness managers, unable to beg, borrow, or steal archeologists to complete the evaluations, became very frustrated with the collision of mandates. Finally, during the summer of 1996, an archeologist from the system support office detailed to Yellowstone put together onsite classes to teach backcountry managers to survey sites for archeological resources. This system has worked very well. In the last two years, four campsites and numerous trails have been relocated after being surveyed under the supervision of a qualified archeologist by backcountry managers trained during this class. They also work under the direction of the archeologist to document these surveys.

In the summer of 1997, in another coordination effort, cultural resource and fire management staff worked together on a project to reduce buildups of fuel around wickiups in the park. This fuel reduction effort will help protect these important cultural resources in the event of future fires.

Roads and Utility Corridors Versus Native American Trails. A good trail is a good trail—we have built our roads and utility corridors along many of the trails used prehistorically and historically throughout the park by Native Americans. A good example is the Bannock Trail, upon which much of the upper segment of the Grand Loop Road was built. Archeological resources are often found during cultural resource inventories for road widening or reroutes for the park's twenty-year federal highways road improvement project.

Obsidian Cliff Preservation. Obsidian Cliff is one of Yellowstone's premier cultural and natural resources. It has been an obsidian collection source for Native Americans since approximately 8800 BC, and was designated a National Historic Landmark in 1996. The associated interpretive exhibit kiosk in the parking lot across the street was built in 1931, and was the first nature shrine in the National Park Service.

The Obsidian Cliff area has many inherent safety and protection conflicts. Visitors want to see this important site (identified as a sacred site by affiliated tribal representatives), yet the lack of safe access presents problems. The base of the cliff along the road has been vandalized by visitors for years through unauthorized obsidian collection, and social trails have caused erosion. Backcountry archeological obsidian quarry sites on the top of the cliff (which were revealed during the 1988 fires) will be threatened as they become better known. The road is scheduled to be studied for potential widening or relocation in the future as part of the park's federal



Figure 6. Obsidian Cliff (Yellowstone National Park Branch of Cultural Resources slide collection).



Figure 7. Obsidian Cliff interpretive kiosk (Yellowstone National Park Branch of Cultural Resources slide collection).

highways road improvement project. Unfortunately, widening will be limited by the base of the cliff and wetlands across the road.

The park is considering producing a management plan for the area, using an interdisciplinary team. This team would address issues such as safety, protection of the resources, interpretation, and road widening or relocation. In the spring of 1998, a Shoshone-Bannock team will inventory the area for ethnographic resources, and their recommendations will be included.

Conclusion

Increased Workload. It is a given that the re-engineering of the NHPA compliance process has transferred some of the cultural stewardship and compliance tasks from the cultural resources specialist to division representatives. It has increased the workload on already overworked staff, and in most cases required the addition of a skilled seasonal worker to assist with inventory and evaluation. However, it has given divisions a greater sense of ownership and responsibility. Their understanding of the time frame and costs required to complete inventory and compliance before a project goes forward has forced divisions to prioritize projects, and focus on those which are most critical. This process will also save the park time in the long run because if it is done right the first time, we won't have to go back and correct earlier mistakes. The resources will also benefit because they will no longer be damaged by people with good intentions.

Willing Partners. No partnership can work without willing partners. In this case, the cultural resources staff was required to forgo some control on projects; staff from other divisions have to be interested and willing to continue to learn the resources and procedures. Division representatives must also continue to train field staff if the program is to succeed. Due to annual seasonal staff turnover, this is a great time commitment.

Support of Management. Yellowstone's upper management have fully supported this process. They were aware that the previous system had flaws, and looked critically at the new one. They required communication with and buy-in by our state historic preservation offices before the process was approved, and have supported the additional training and staff required to implement this system.

Reality Check. No new program is going to work 100 percent of the time, especially if it means changing old habits. How should one react when the program stumbles?

Park staff meet biannually to discuss pros and cons of the new system. There is vigilance for "correspondence creep": the addition of unnecessary steps in the paperwork process. Divisions which have had particularly good or particularly difficult experiences pass on their knowledge to others. Staff have met regularly with state historic preservation office staff to discuss projects and get feedback on the new system.

A Delicate Balance

This process has forced a park which has done business in its own unique way for 125 years to make some drastic changes. While the process continues to evolve, the preservation and protection of our resources remain at the heart of everyone's efforts.

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THE WAR AGAINST BLISTER RUST IN YELLOWSTONE NATIONAL PARK, 1945–1978

Katherine C. Kendall and Jennifer M. Asebrook



FOLLOWING THE DISCOVERY in the early 1900s that white pine blister rust threatened North American forests, the federal government launched a massive campaign to eradicate the disease. This control program ran for more than fifty years, first under the auspices of the Office of Blister Rust Control (created in 1916 as part of the U.S. Department of Agriculture Bureau of Plant Industry) and, later, under the U.S. Forest Service (Benedict 1981). The war on blister rust cost more than \$150 million and was the most extensive forest disease control effort in the history of American forestry (Maloy 1997). As scientists now understand, this effort was ineffective in preventing the spread of blister rust. In the Greater Yellowstone Area, the fight against blister rust did not begin until the 1940s and, paradoxically, gained momentum just as blister rust control programs in other regions dwindled in the face of evidence that eradication measures were not working. The story of Greater Yellowstone's belated entry into the war against blister rust and the persistent commitment to a program that had been discredited in other areas offers a valuable case study in how resource management decisions are influenced by a complex matrix of scientific, social, and economic forces.



Figure 1. A typical blister rust control camp in Yellowstone National Park (Yellowstone National Park Archives).

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Blister Rust Life Cycle

BLISTER RUST IS CAUSED BY THE FUNGUS *Cronartium ribicola* Fischer. This organism requires two alternate hosts: white pines and plants of the genus *Ribes* that includes wild currants and gooseberries. The rust is a harmless annual on ribes plants but is a lethal perennial on many white pine species.

White pine blister rust cannot be passed directly from pine to pine. The fungus has a complex life cycle involving two spore phases in the bark of white pines and another three phases in ribes leaves. After residing in trees over the winter, the fungus produces sacks in spring that push through the bark, creating tree blisters or cankers. Each sack is filled with thousands of orange-colored spores. In May and June, these sacks mature and rupture, releasing spores that can be wind-dispersed many miles to ribes plants. The spores create pustules on ribes leaves and, under favorable conditions, a second type of spore is produced that infects other ribes plants. In late summer or fall, telia (hair-like spore columns) develop on the pustules, creating a brownish or rust-colored mat on the underside of ribes leaves. Telia produce sporidia, the spores that infect white pine. Sporidia are wind-dispersed and usually travel only a few hundred feet. However, under highly favorable conditions it may spread a mile or more (Miller et al. 1959). Viable transport and germination of sporidia usually occurs when the weather is cool (temperatures less than 70 degrees Fahrenheit) and moist (relative humidity greater than 97%). When the spores reach pine needles, the sporidia germ tubes enter the stomata and, within a year, grow into the bark at the base of the needle bundle. As the fungus grows, the bark swells and releases ribes-infecting spores that perpetuate the cycle. Once a canker grows completely around the trunk, it is girdled and the tree dies. Sometimes only branches are infected but this, too, can kill the pine if cankers defoliate most needle-bearing twigs.

About half of the 80 species of ribes native to the United States grow within white pine range. The susceptibility of ribes to blister rust varies by species (Miller et al. 1959), although all are capable of supporting rust. Of the ribes found in the Yellowstone area, the order of susceptibility to blister rust is *Ribes petiolare* > *R. montigenum* = *R. inerme* > *R. cereum* = *R. setosum* > *R. lacustre* = *R. viscosissimum* (Maloy 1997). Two white pines occur in this region: whitebark and limber pine. While both are highly vulnerable to blister rust, whitebark pine is rated as the most susceptible white pine in the world (Hoff et al. 1980).

Distribution

BLISTER RUST WAS FIRST DISCOVERED in the United States in 1906 in Geneva, New York (Miller et al. 1959) on a plantation of young white pine (*Pinus strobus*) seedlings imported from a European nursery. Later dating of cankers on other white pines demonstrated that blister rust was likely introduced to the east coast in 1898. Ironically, blister rust spread to Europe from the Baltic region of Russia, where white pines had been introduced from America (Miller et al. 1959). By 1900, blister rust had spread over most of Europe.

Blister rust was introduced to the West Coast of North America at Vancouver,

British Columbia, in 1910, again on infected nursery stock from Europe. It went unnoticed until 1921 when it was found in several white pine stands in British Columbia and northwestern Washington (Miller et. al. 1959). The disease then spread in several stages along the West Coast. Blister rust moved slowly through northwestern Washington until the 1920s when the rate of spread increased dramatically. By 1933, the disease was established along the Oregon coast, well into northwestern California, through northern Idaho, and into western Montana. This surge corresponded to 'rust waves' regulated by favorable weather conditions in 1919, 1921, 1923, 1927, 1933, 1937, and 1941 (Maloy 1997). From 1943 to the late 1960s, blister rust infection spread in a slower and less uniform fashion into Wyoming and arrived in Yellowstone and Grand Teton national parks. After its discovery in Laramie, Wyoming, in 1967, blister rust was not found south of Wyoming until 1990 when it was found on southwestern white pine (*Pinus strobiformis*) in southeastern New Mexico (Conklin 1994).

Control in Yellowstone and Grand Teton National Parks

THE FIRST BLISTER RUST SURVEY in and around Yellowstone National Park was conducted in 1934. Although no evidence of blister rust was found in the park at this time, the survey determined that approximately 550,000 acres, or about 25% of the park, supported stands with whitebark and limber pine trees.

Scouting for the disease increased in Yellowstone once blister rust infection was found on ribes in 1937 in the Bear Creek drainage of the Gallatin National Forest, 19 miles from the park boundary. Reconnaissance focused in areas with heavy concentrations of *R. petiolare*, a species highly susceptible to infection. In 1944, blister rust was found for the first time in Yellowstone on two *R. petiolare* bushes in Clematis Gulch in the Mammoth Hot Springs area. From this point, blister rust continued to spread through the park. By the end of the blister rust control era, 31 areas totaling 115,470 acres were designated for protection (Figure 2).

The period 1945–1956. Blister rust control officially began in Yellowstone in 1945, coinciding with the replenishment of the labor pool with the discharge of troops at the end of World War II. One camp with 20 men was established to begin eliminating ribes in three control units: Mammoth, Mount Washburn, and Craig Pass. Like many of the control units that were to be established along the Grand Loop road system, these original units were chosen because of their scenic value along roads and in high visitor-use areas. These units totaled 9,600 acres and, with the addition of the Mount Washburn extension unit (3,500 acres) in 1951, were the focus for treatment until 1956 (Figure 3).

Treatment during these years went through many changes, due mostly to the development of new technology and herbicides. The first year of control included hand pulling ribes plants and chemical spraying of ammonium sulfamate in solution on root stocks. Manual removal continued to be a significant method of eradicating ribes plants through the entire program, but herbicides quickly became an integral component of ribes control in Yellowstone. Although its blister rust control program

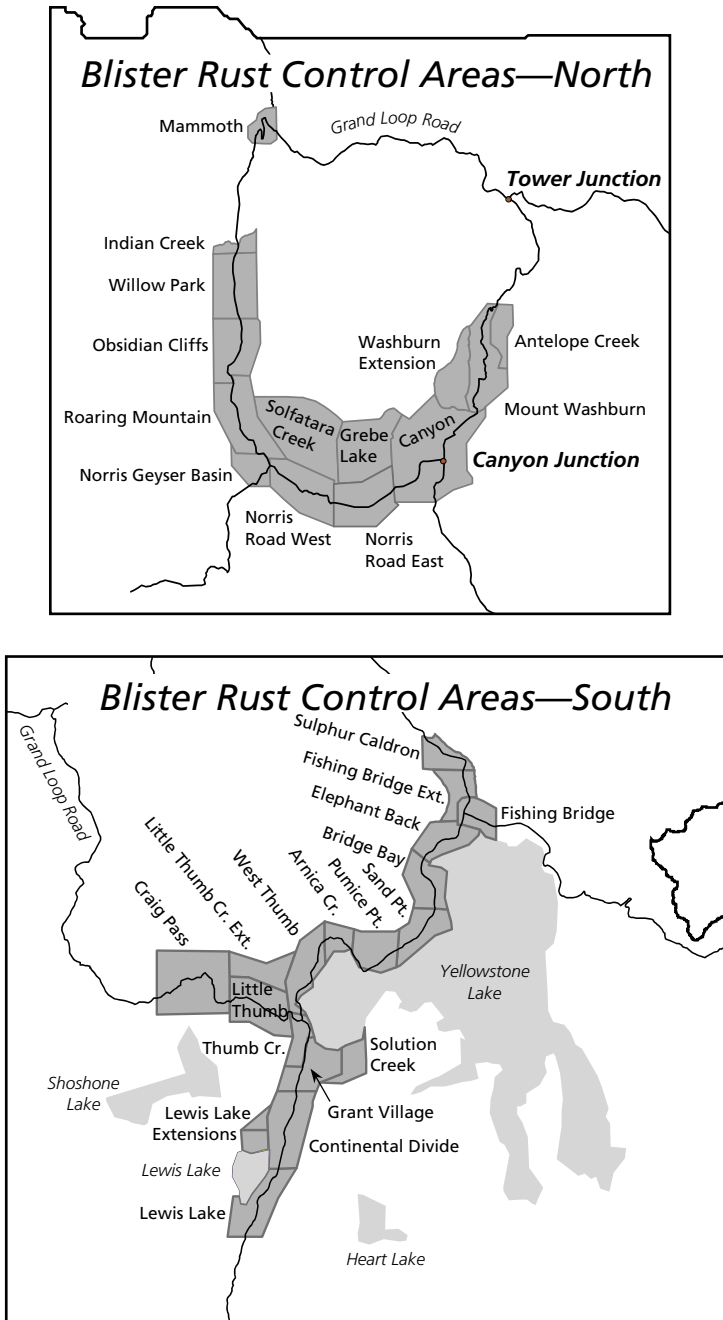


Figure 2. Blister rust control units in Yellowstone National Park.



Figure 3. Blister rust control crew (possibly at Canyon), Yellowstone National Park, 1952 (Katherine Kendall, Science Center, Glacier National Park).

started later, Yellowstone began to use chemicals three years before other national parks in the region.

From 1946 to 1948, 5,592 gallons of ammonium sulfamate and 2,4-D (Dichlorophenoxyacetic acid), a common defoliant, were sprayed on root stocks or leaves of ribes plants. Beginning in 1949, however, and continuing until 1967, Yellowstone used 2,4,5-T (Trichlorophenoxyacetic acid) for chemical ribes control. Yellowstone, like many other parks and national forests, used more powerful chemical applicators as they were developed. In 1952, the park began using portable power sprayers, increasing the efficiency of chemical application of 2,4,5-T on ribes. By 1958, they began to use Hi-Fog units with 1,000 pounds of pressure per square inch at the nozzle, capable of producing a mist-like spray. This was desirable because it made it possible to use only small amounts of concentrated spray on the ribes bushes.

When combined with 2,4-D, the hormone chemical 2,4,5-T creates “Agent Orange,” the defoliant widely used during the Vietnam War. This chemical was eventually used by other agencies and parks throughout the region despite the fact that the dangerous dioxin TCDD had been found in 2,4,5-T in 1957. Workers clearly did not know the potential hazards of this chemical. One Yellowstone worker later wrote: “We pumped tons of 2,4,5-T...Had great water fights with it—don’t know if Agent Orange had any effects on co-workers—not on me or progeny.” Clark Penn, a blister rust control crew member, reports that the portable backpack sprayers used in Glacier National Park in 1952 had open-topped tanks. As a result,

the herbicide solution often sloshed out of the tank and down the men's backs as they scrambled through brush and over mountainsides (personal communication, September 1998).

During the Depression years of 1933–1940, before blister rust control began in the Yellowstone region, an infusion of labor through the Civilian Conservation Corps (CCC) and money from emergency programs greatly accelerated control programs across the country. The control workers during this period, however, were often found to be inexperienced and without interest in the work. Retention of a competent labor force was a constant problem prior to the late 1940s (Maloy 1997). The post–World War II crews used in Yellowstone, however, were “run ruthlessly in a military fashion.... Veterans fresh from military service and the war necessitated a similar military treatment to insure the discipline and efficiency tantamount to doing the job and doing it right. Not only did this partially utilize the surplus workers available but it established a degree of excellence unparalleled in earlier times” (USDA 1947). This paramilitary approach appears to have instilled an esprit de corps, and established a reputation of blister rust control crews as being hard-working and tough that persisted to the end of the program. Blister rust control was also supported on many levels because these personnel were also available and sought-after for fighting fires (Benedict 1981).

As ribes infection continued to spread, the cost of control increased. The more seasoned crews in Yellowstone, no doubt, helped reduce costs and improve results. From 1945 to 1956, crews had treated or pulled 3,825,186 ribes plants, used 122,493 gallons of 2,4,5-T, initially treated 13,060 acres, and reworked 9,290 acres (Table 1). A total of 414 employees had put in 17,826 work-days and \$381,000 (\$2,273,670 in 1994 dollars) had been spent on the program.

The period 1956–1966. Beginning in 1950, however, rust rapidly intensified and spread through Yellowstone. Blister rust was found for the first time on a limber pine in 1950 (1948 infection origin) in the Slide Lake Creek drainage approximately three miles north of Mammoth Hot Springs and on a whitebark pine (1945 origin) in the Mount Washburn area in 1951. Clearly, white pine infection had been present longer than previously recorded. Ribes infection was also found in Lamar River Valley, on Stevens Creek, and on Elk Creek, and was twice as heavy as 1946 estimates at Slide Lake Creek by the early 1950s. By 1954, heavy pine infection centers had been found adjacent to the north and west boundaries of the park and infected limber pine were found within one mile of the Mammoth control unit. So in 1956, Yellowstone included 20,190 additional acres in the program with control units at Antelope Creek, Canyon, and Fishing Bridge, and an addition to Craig Pass (Figures 1 and 5).

Nineteen fifty-six was also the year that blister rust control began at Grand Teton National Park when the disease was found for the first time on a limber pine at Deadman's Bar. Grand Teton treated approximately 1,000 acres at this one control unit during four individual years. They eliminated 182,700 ribes plants through hand-pulling and spraying in 1957–1958 (Figure 4) and used 10,990 gallons of 2,4,5-T (Table 2). In 1961 and 1966 another 19,900 ribes plants were removed by

Table 1. Blister rust control activities in Yellowstone National Park.

Year	Total # of ribes removed	Total acres worked	Total man days	Gallons of herbicide	Trees Examined for Pruning	Real Cost (\$)	Adjusted Cost (1994 \$s)
1945	95,769	1,567	992	765		7,360	60,638
1946	94,200	599	768	1,056		10,831	82,286
1947	382,917	4,877	3,172	1,101		61,250	406,705
1948	172,700	1,967	1,495	2,670		25,554	157,532
1949	406,000	1,900	1,939	6,313		33,828	210,549
1950	221,000	1,160	1,260	5,950		23,865	147,121
1951	48,000	870	870	990		14,680	83,795
1952	365,000	1,210	1,220	10,010		30,446	170,039
1953	469,000	2,310	1,710	21,930		42,103	233,374
1954	627,000	2,370	1,910	21,170		38,138	210,492
1955	635,000	1,440	1,490	34,700		53,470	296,061
1956	308,600	2,110	1,270	21,430		39,427	215,077
1957	372,700	2,798	2,570	37,840		74,511	392,777
1958	473,000	10,660	4,030	59,260		121,961	625,671
1959	879,000	7,930	4,680	77,020		121,657	619,190
1960	628,000	13,110	3,490	36,300		96,433	483,194
1961	223,000	11,720	3,820	15,000		134,742	668,020
1962	140,000	10,090	2,090	7,430		83,930	411,368
1963	279,000	13,030	3,080	18,000		106,949	517,806
1964	357,000	17,860	3,630	17,800		108,967	520,743
1965	452,000	11,410	3,350	23,400		116,735	548,729
1966	176,000	11,030	2,810	5,500		113,862	520,081
1967	98,966	14,513	2,305	1,750		117,900	523,707
1968	15,498	7,121	1,348			126,038	537,221
1969	9,261	11,200	1,270			110,250	446,007
1970	21,213	10,840	1,067			118,740	453,371
1971						118,000	432,332
1972	340				2,798	79,000	280,106
1973	1,027				21,134	82,000	273,651
1974	1,493				55,299	78,200	235,283
1975	2,117				123,293	79,100	218,053
1976	135					47,313	123,257
1977	50					3,000	7,335
Total	7,954,986	175,692	57,636	427,385	202,524	2,420,240	11,111,571

*1949–1967: 2,4,5-T herbicide used.

1970: Ribes eradication ended in Yellowstone National Park.

1971–1977: Pruning program only. Funds may be estimates.



Figure 4. Blister rust control crew in Grand Teton National Park, 1957 (Katherine Kendall, Science Center, Glacier National Park).

hand-pulling; no chemicals were used in those years.

Blister rust continued to infect unprotected whitebark and limber pines. A 1961 survey outside the Mammoth control area found 7% of the trees infected, with 67% of those having killing cankers. With infected trees also found near Glen Creek, Golden Gate, Obsidian Cliff, and the Tower Fall campground, Yellowstone continued to add

Table 2. Blister rust control activities in Grand Teton National Park.

Year	Total ribes removed	Total acres worked	Total man days	Gallons of spray
1957	130,700	620	280	4,100
1958	51,000	680	280	6,890
1959		No ribes eradication conducted		
1690		No ribes eradication conducted		
1961	7,000	900	210	
1962		No ribes eradication conducted		
1963		No ribes eradication conducted		
1964		No ribes eradication conducted		
1965		No ribes eradication conducted		
1966	12,900	980	90	
Total	201,600	3,180	860	10,990



Figure 5. One of the 1956 blister rust crews in Yellowstone National Park (Katherine Kendall, Science Center, Glacier National Park).

other blister rust control areas to the program. In 1962, 35,730 additional acres were slated for protection at Norris (East), Norris (West), Lake, Bridge Bay, Grant Village, West Thumb, West Thumb Creek, Lewis Lake, Continental Divide, Arnica Creek, Pumice Point, and Sand Point, and, in 1963, Grebe Lake (Figure 1). Finally, in 1964, the last units, totaling 41,230 acres, were added for protection at Solfatara Creek, Norris Geyser Basin, Roaring Mountain, Obsidian Cliff, Willow Park-Indian Creek, Sulphur Cauldron, Elephant Back, Solution Creek, Lewis Lake Extension, Little Thumb Creek, and Little Thumb Creek Extension. From 1957 to 1966, crews had treated or pulled 3,979,700 ribes plants, used 297,550 gallons of 2,4,5-T, and treated 109,638 acres (Table 1). A total of 778 employees had put in 33,550 work-days, and \$1,079,746 (\$5,307,580 in 1994 dollars) had been spent on the program. Many of these figures were double those from the first decade in Yellowstone.

It is interesting to note that during this time of blister rust control program expansion in Yellowstone and Grand Teton, many other areas were abandoning their efforts to eradicate ribes due to its questionable effectiveness. Soon after World War II, a pathologist employed by the Office of Blister Rust Control from the University of Idaho found that infection could spread beyond designated protective zones and that the amount of ribes live-stem allowed per acre was too high (Maloy 1997). A 1958 study in the Lakes Region found that ribes populations had little relation to rust infection rate (Maloy 1997). Mount Rainier National Park ceased control activities as early as 1953 because, despite 24 years of control, white pine had been nearly eliminated in the park by the disease. By 1958, similar revelations in Glacier National Park resulted in a decline in ribes eradication and more emphasis on treating white pines with antibiotics such as Acti-dione and Phytoactin. Glacier stopped all ribes eradication by 1961 and used only antibiotics until all treatment

against blister rust ended in 1968.

One obstacle to the blister rust control program was the continued rise of wages and other expenses. Two problems contributed to this. First, while finding and removing the first ribes cost little, finding and removing the last ribes in a pine stand cost a lot more (Benedict 1981). Second, it became clear that repeated reworking for up to three or four years were necessary to break the cycle of ribes re-germination. While some land managers had already begun to use one-man crews or contractors to eliminate the cost of camps (Benedict 1981), Yellowstone continued to staff large camps.

It is also puzzling that Grand Teton started a blister rust program in the first place given a 1945 review of the park's blister rust status. The report made a recommendation against attempting protection of white pine from blister rust in Grand Teton because conditions appeared to render protection impractical if not impossible due to (1) high susceptibility of whitebark pine; (2) general distribution of *Ribes petiolare*, a highly susceptible ribes known to infect whitebark pine over considerable distances; (3) rough topography involving hazardous and costly ribes eradication; (4) occurrence of ribes in open upland sites favorable to wide dissemination of sporidia from ribes to pine; and (5) meteorological conditions characteristic of high elevations, including mists and strong winds, favorable for formation of sporidia and their rapid transport over long distances.

Three circumstances caused Yellowstone to buck the trend and continue with control efforts. First, blister rust was still spreading in the park. It would have been difficult to stop control measures when there was available money and the problem was so evident. Second, and more important, managers believed that ecological conditions in the Yellowstone area were different from the northern Rocky Mountains. Since infection levels were lower in this area than in northern Idaho and western Montana, they believed that the relatively cool and dry conditions of Yellowstone's higher elevations were unfavorable for spread and intensification of blister rust. With this low chance of spread in combination with large eradication units, they believed there was a possibility of total blister rust control. Finally, other studies found that blister rust infection did not necessarily constitute a lethal threat and that occasionally trees remained free of rust in severe infection conditions. There was still reason to be hopeful.

The period 1967–1977. Nineteen sixty-seven was probably the year that the blister rust program in the West turned from hopeful to hopeless. First, it was then that the Northern Region (Region 1) of the U.S. Forest Service drastically curtailed its blister rust program. It acknowledged that, due to climatic conditions, ribes eradication had not given adequate protection to white pines except on a very small acreage. They also stated that the antibiotic Phytoactin was not effective in fighting rust infection and the antibiotic Acti-dione was not effective unless cankers were scarified and received direct application of the material. At that time, the agency made the decision to focus on a rust-resistant tree breeding program. Second, by 1968 National Park Service blister rust funding was cut from all the region's parks except Yellowstone. Some still conducted rust distribution surveys and certain scenic areas were treated

on an individual-tree basis, but all significant control efforts were abandoned. Lastly, a 1968 study in the western white pine region found no significant differences in rust incidence between stands never eradicated and stands from which ribes were eradicated as many as eight times (Maloy 1997). The study concluded that long-range spread must, therefore, be of greater consequence than was previously thought.

Yellowstone did curtail the blister rust control program by 1968, reducing its seasonal force by 80%. Yellowstone also did not initiate control work in units approved in 1964, leaving only 23 control units, totaling 95,160 acres, receiving some treatment (Table 1). However, at this late date, a study was initiated to test if eradication of ribes reduced or eliminated blister rust infection at the Mammoth and Mount Washburn complexes.

In addition, between 1969 and 1977, Yellowstone began a pruning program at Mammoth, Mount Washburn, and Glen Creek sites. Pruning involved cutting off limbs with non-lethal cankers and excising lethal cankers on the bole of the tree. Although all ribes eradication operations were suspended by 1969, Yellowstone continued to get funding through 1977 for blister rust control and was one of the last places to practice control in the region. These last few years of ribes control and the pruning from 1967 to 1977 resulted in the removal of 144,938 ribes plants, the use of 1,750 gallons of 2,4,5-T, and the treatment of 43,674 acres, much less than in the prior decade (Table 1). A total of 459 employees had put in 7,187 work-days and \$959,541 (\$3,530,323 in 1994 dollars) had been spent on the program. In addition, 5,162 acres had been pruned with over 200,000 trees examined for cankers.

Conclusion

IN THE END, NEARLY 8 MILLION RIBES PLANTS had been removed from Yellowstone National Park, over 175,000 acres had been worked and reworked for blister rust control, 1,651 employees had put in over 57,000 work-days, and more than 427,000 gallons of herbicide had been sprayed on ribes plants throughout the program. The majority of the ribes pulled were in the Mount Washburn (56%) and Norris-Canyon (27%) control areas. A total of \$2,420,238 (\$11,111,570 in 1994 dollars) had been spent on the 32-year program. From a cost perspective, this was almost triple what Glacier National Park spent on blister rust control and nearly ten times the amount spent on control in Mount Rainier, Grand Teton, and Rocky Mountain national parks. The same trend follows for the number of ribes removed, employees hired, and herbicide used.

It was only in 1978 that blister rust control came to complete stop when a paper was published on the non-effectiveness of ribes eradication as a control of white pine blister rust in Yellowstone National Park (Carlson 1978). A study in Mount Washburn found that rust incidence remained low even though ribes were extensive in some areas. The study concluded that ecological conditions of the area probably limit rust spread, that eradication of ribes was clearly not warranted in the future, and the existence of white pine in Yellowstone was not threatened by blister rust.

More recently, scientific opinion has changed on the long-term outlook for Yellowstone white pines in relation to blister rust. Heavy infection and mortality

from rust continues to move into areas previously thought safe from the epidemic. Rare weather events have created infection “wave years” several times in the last couple of decades in the Sierra Nevada; the same is likely to occur eventually in the Greater Yellowstone Area. Monitoring plots established in Yellowstone for Carlson’s study were revisited in the mid-1990s. All trees sampled in 1970 were uninfected and alive; by 1996, 11% were infected with rust and 2% were dead (Kendall and Schirokauer, in preparation). Perhaps even more telling is the current status of seedlings and saplings in Yellowstone that were healthy when individually marked in 1969. When relocated in 1996, 18% were dead and another 19% were infected with rust (Kendall and Schirokauer, in preparation). There is clearly cause for concern for the future of whitebark and limber pine in Yellowstone.

Although all the Herculean labors of surveying for rust and pulling and spraying ribes were in vain, most blister rust control crew members look back on their days with great fondness and enthusiasm. Blister rust control money put a lot of young men through college and summers in the camps launched more than a couple of National Park Service ranger careers. This episode in history serves to remind us of the grave danger of exotic species to native flora and fauna. It also counsels caution when we are tempted to try saving one native species at the expense of another, or at the risk of environmental contamination. The chance of success must be weighed against the costs and consequences.

Acknowledgments

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SETTING YELLOWSTONE'S RECORD STRAIGHT: A. C. PEALE'S JOURNAL OBSERVATIONS DURING THE 1871 HAYDEN SURVEY

Marlene D. Merrill



I LIKE TO THINK THAT SOMEWHERE IN HEAVEN there is great rejoicing whenever a dusty old handwritten journal is discovered—especially if it includes a record of an historic event. I even like to imagine a Heavenly chorus shouting: “Now...history will get the story right!” Why? Because, first-hand journal accounts provide far more reliable accounts of historic events than descriptions written after-the-fact in the form of reminiscences and highly edited reports.

There are a significant number of inaccurate published histories written by participants in Yellowstone's early surveys. Their writers often embroidered facts, exaggerated claims, and omitted relating particular survey events. Some writers may have done this to enhance their own reputations and their parties claims for recognition. Others may have lost their field notes and diaries or neglected to keep a record of an experience they then later mis-remembered. Others simply forgot, or believed certain aspects of a survey were too inconsequential to write about.

Early survey publications come in many forms, and include official reports, scientific and popular articles, as well as memoirs written long after the events. Historians, mostly out of necessity, have relied on these publications to create what is now a substantial body of secondary literature describing and analyzing the work of these first surveys. So, perhaps it is not surprising that, for over a century, a series of myths and inaccuracies about these early surveys continue to find their way even into contemporary accounts of Yellowstone history.

This is especially true for Hayden's 1871 survey—probably the most famous of all the Yellowstone expeditions. Its scientific discoveries led Congress to set aside the area as the world's first national park. As if that were not enough, Hayden's survey also provided the earliest on-site images of the area in the form of photographs by the party's photographer, William Henry Jackson, and paintings by its guest artist, Thomas Moran. Jackson's and Moran's work shaped—and continues to shape—the public perception of Yellowstone and the American West.

This paper is based on research for the author's books: Marlene Deahl Merrill, editor, Yellowstone and the Great West: Journals, Letters, and Images from the 1871 Hayden Expedition (Lincoln: University of Nebraska Press, 1999); and Marlene Deahl Merrill, editor, Seeing Yellowstone in 1871: Earliest Descriptions and Images from the Field (Lincoln: University of Nebraska Press, forthcoming, 2005).

Unfortunately, inaccurate secondary accounts about this survey now abound in books and articles. Even meticulous and highly regarded scholars recycle these commonly held inaccuracies. Let me read a paragraph written by William Goetzmann from his book *Exploration and Empire: The Explorer and the Scientist in the Winning of the American West* (1966):

On July 31, Hayden, Schoenborn, Elliott, and Peale struck out to the northwest, bound for the Firehole Geyser Basin. They traveled some thirty-one miles through a rough country of rocks and fallen timbers before they reached a stream which turned out to be the Madison. There they discovered [*sic*] what is now known as the Upper Geyser Basin. Following the east fork of the Madison, they eventually reached the Firehole River and the Lower Geyser Basin,...[O]ver such terrestrial marvels as the Punch Bowl, the Dental Cup, and the Bath Tub towered the giant waterspouts—Grand Geyser, the Giant and Giantess, and of course, Old Faithful.¹

Thanks to the journal kept during the survey by Hayden's mineralogist, Albert Peale, it is now possible to correct the errors and omissions in this passage, and learn that Hayden's "small party," also included a guide and hunter, a cook, and the "driver" of the horse-drawn odometer. Although they did not start out together, Hayden's party eventually caught up with another small group from the Barlow-Heap party—a separate Yellowstone survey from the U.S. Corp of Army Engineers that shared Hayden's military escort. Capt. Barlow and Hayden explored and studied the geyser area together (a fact that Hayden does not disclose in his official report). The stream the parties reached was not the Madison, but its East Fork (now called Nez Perce Creek). The party reached the Lower Geyser Basin first, *then* turned south to explore the Upper Basin (not the other way around). Hayden's party saw only two of the great geysers in action, Old Faithful and the Grand. They observed only the craters of the Giant and Giantess.

One could claim that these corrections are trivial and that I'm only nit-picking with a highly esteemed scholar. But, the point I wish to make is that Goetzmann (and other scholars) erred because they probably did not know that Peale's (and other) daily survey records were becoming available. So, they relied on accessible published sources, primarily Hayden's official report, Jackson's mis-remembered recollections, and several earlier secondary accounts of this famous expedition. Because Hayden and Jackson remain the survey's two most famous members, their authorship, unfortunately, lends credence to the belief that their accounts are both reliable and complete.

To look for accurate accounts of Yellowstone surveys, one has to look for journals, fieldnotes, and letters written by survey members *during* their expeditions. The problem, of course, is that few of these are readily available, or exist at all. Up until recently, few scholars have spent the time and money to search them out, particularly when they are featuring only brief descriptions of early expeditions. Thanks to drawing on heretofore unpublished primary sources, Yellowstone historians Aubrey Haines, Lee Whittlesey, and Paul Schullery, have perceived and interpreted Yellowstone's history in a number of new ways.

Albert Peale's daily journals written during the 1871 survey, illustrate how his first-hand accounts can help correct the errors and omissions in the later histories of this famous survey. Let me tell you a little more about him.

Peale was a small-framed, wiry, and modest young man who had received his medical degree from the University of Pennsylvania shortly before the survey got underway. During his final year, he studied with Ferdinand Hayden, who was a professor of geology and mineralogy there. Although Peale was descended from the illustrious Peale family (his great grandfather was the famous Revolutionary War painter, Charles Willson Peale), Albert seemed to have little interest in basking in their reputations. Instead, he carved out his own long-lasting niche as a reliable and level-headed mineralogist/geologist. From his first work with Hayden in 1871 until Hayden's death in 1887, he became Hayden's closest friend and colleague. Peale undertook the earliest scientific investigations of Yellowstone's thermal features in 1871, 1872 and 1878. His published reports on Yellowstone's geysers, hot springs, and fumaroles came to more than 435 pages, and constituted nearly the entire second volume of Hayden's two-volume twelfth (and final) annual report, published in 1883.

Peale's 1871 journal writings appear in two small and bruised leather volumes. Because they ended up in two different repositories (one in the Yellowstone archives, the other in Denver's U.S.G.S. Field Library) their importance has been overlooked until I began working with them in 1990 in preparing my book: *Yellowstone and the Great West: Journals, Letters, and Images from the 1871 Hayden Expedition*.

Peale did more than write in his journal. While participating on the survey, he also wrote a series of "letters" that were published in his hometown newspaper, the *Philadelphia Press*. Both Peale's journal and newspaper writings are fresh and candid; moreover, they reveal one of the earliest spontaneous and personal responses to features in the Greater Yellowstone Area. Peale not only corrects facts and misleading information from other published accounts, he supplies important information which his cohorts omit entirely. For instance, Peale describes many of the circumstances surrounding Jackson's photographic work, and identifies the settings and individual survey members who were Jackson's subjects. We learn, for instance, that Jackson took ferrotype pictures along the route and gave them away. In one case, the party camped near a Montana ranch owned by a Mr. Allen, who provided them all with milk, cream, and fresh butter. Such generosity demanded some kind of thank you, so Jackson took a ferrotype of the ranch and presented it to Allen. "[Allen] was very pleased with it," Peale records in his journal entry for Thursday, September 7.

At the time, Peale probably didn't think his comments about Jackson's work were very important, but today, this record alone adds significant information to Jackson's now-historic photographs.

More generally, Peale provides a close look at Hayden's style of leadership as well as a description of the survey's actual work. He reveals that the survey operated in quite an informal—if not casual—manner. Small groups of men were always off on specialized assignments, while Hayden often worked alone or alongside only one or two others and at the end of the day often remained aloof from others at the party's campsites.

Peale also describes the scientific contributions of individual members of the party. Little has been known about this particular aspect of the survey work, for Hayden rarely singled out individual people for credit in either his report or later articles. As a result, particular contributions have been assigned either to Hayden, himself, or to the party as a whole. For instance, one of the survey's major achievements was mapping the shoreline and recording the various depths of Yellowstone Lake. In his journal, Peale names and describes the work of three men who undertook these earliest depth soundings of the lake. This was a tricky and dangerous business, given the uncertain seaworthiness of their small frame boat which had been put together for this purpose, along with the size and volatility of Yellowstone Lake. Hayden does not name or acknowledge the work of these three men in an official progress letter to the Secretary of the Interior. Instead, he takes full credit for the work, saying: "I have made quite thorough soundings of the Lake."² If for no other reason, Peale's writing is important for finally giving credit where credit is due.

Peale's writing corrects errors and repeatedly clarifies misleading impressions from later published accounts. Discovery claims, of course, are a chancy business in an area like Yellowstone, where native people and white trappers and hunters had made countless unrecorded "discoveries." Nevertheless, Jackson claimed in *Pioneer Photographer* that their party was "so far as records show," the first group of white men to visit Mammoth Hot Springs.³ Hayden didn't make such a claim, but he made much of the fact that his was the first exploring party to visit Mammoth Hot Springs. In this, he was correct. Neither the Washburn-Langford party in 1870, nor the Cook-Peterson-Folsom party in 1869 visited these springs. Hayden's Report and Jackson's recollections, however, create the impression that this dramatic area was rarely—if ever—observed by white men. Peale, however, makes it abundantly clear that, by 1871, the springs had become known to a sizable number of men from neighboring areas. In all fairness, Hayden, unlike Jackson, does report the fact that their party discovered, "a number of invalids" there using the springs to effectively treat cutaneous diseases, especially "syphilitic diseases of long-standing."⁴ But, there is much more to this story than mentioning the presence and rehabilitation of invalids at the springs, as we can see from the "letter" that Peale wrote for the *Philadelphia Press*, while still in Mammoth. He writes:

Mr. J. C. McCartney and Mr. H. R. Hore [*Horr*], with commendable foresight, have taken out a claim for 320 acres, which covers a considerable portion of the springs. They expect to commence the erection of a two-story hotel next week. It requires no stretch of the imagination to see this place thronged with invalids drinking this water and bathing in it for their health. When the Northern Pacific Railroad runs through this country, this will be one of the places that no tourist will think of neglecting, for it will rank with any natural curiosity that the world can produce.⁵

Needless to say, Hayden did not include these details in his report, even though he was very familiar with the railroad's recognition of Yellowstone's potential as a tourist attraction at the time. Other evidence reveals that Hayden was even seeking possible ways to route future Northern Pacific railbeds into the Yellowstone Valley as

well as to locate geographically feasible routes to connect with the Union Pacific. He was also on the look-out for nearby coal beds and water sources that could eventually be used for locomotive fuel. Although Hayden probably had no *official* connection with the Northern Pacific, Peale's comments suggest that Hayden was making no secret of his party's investigations on behalf of railroad interests.

The fact is, by 1871, Mammoth Hot Springs, as well as large areas of what is today's park, were no longer pristine wilderness areas. Peale frequently refers to meeting up with adventurers and hunters who appeared to be quite familiar with many parts of the area. In fact, while establishing the party's permanent camp at the Bottler brothers' ranch in the Paradise Valley, Hayden hired two guides/hunters from the area. Probably the Bottlers or perhaps one of the survey's guides (known today only as "José"), was responsible for leading the party directly to Mammoth Hot Springs. Hayden's report, however, creates the impression that his party was doing its work in the midst of a *terra incognita*.

Histories of Hayden's first Yellowstone survey rarely treat the presence of the small team of Army engineers that was assigned to explore Yellowstone in the summer of 1871 and to share Hayden's military escort. Based in Chicago, it was led by Captain John Barlow and his assistant, Captain David Heap, both West Point graduates and decorated Civil War veterans. Peale often describes the Barlow party as working "in tandem" with the Hayden party. Hayden on the other hand writes very little about the presence of Barlow's party, and virtually nothing about their work. Barlow, however, wrote a marvelously detailed report about his survey's work in Yellowstone that was published by the Government Printing Office in 1872. In it, he frequently refers to the presence of Hayden and small groups of Hayden's men. Peale's journal confirms this and adds even more details. The fact is, on several occasions Hayden and Barlow did a good bit of fieldwork together, shared information and made joint decisions. This was especially true in the geyser basins where the two plus a few members from each of their parties, explored together, shared scientific data and, not incidentally, became lost.

Peale occasionally poked fun at the Barlow party, and suggested they were novices at fieldwork. He noted that their badly packed supplies repeatedly fell off their mules, requiring the party to leave some members behind to help them re-pack their supplies. Barlow was apparently an amusing character who carried an umbrella and sometimes indulged in two hour lunches. David Heap, Peale reported, is "the most comical looking man. He [wears] a buckskin suit with fringes and has a lot of traps stuck about his person."⁶

Such humorous asides rarely appear in official reports.

Although Peale is a straightforward writer, perhaps what is most appealing about his accounts is that he is also very human. In his journal he confesses to, but never dramatizes, his bouts with fatigue, homesickness, and even fear. By writing in his own private journal, Peale had nothing to lose by candidly recording his survey experiences and his personal reactions to them.

Some of this candidness appears in Peale's journal entry for Sunday, August 6, 1871. After several days spent investigating the geyser basins Peale with Hayden (and several others) thought they were heading to a pre-arranged campsite on the West

Thumb of Yellowstone Lake where they would meet up with the rest of the survey party. But they ran into complications. Peale writes:

In coming down to [Shoshone] Lake the Doctor [Hayden] led the party through a miry place. One of the mules became mired and had to be unloaded and taken back around through the woods the [other] way...[A]fter passing along [the] shores, against which there was quite a surf beating, we struck into the woods, Schönborn [the topographer] leading. José [the guide] said we were going too far to the right, but still we kept on. After a while Elliott [the official artist] left us in disgust. One of the horses of the escort gave out and had to be led. Towards sunset Schönborn and the Doctor came to the conclusion we were lost so we decided to camp at the first water. The soldier and horse with José stayed behind to rest. About a mile and a half further we came to a small lake about 1 mile wide and 2 long which was not down on the map and must be the headwater of one fork of the Snake River. We are away to the south of the Yellowstone Lake. We traveled about 22 miles through the timber, some of it of the worst description. I tore my green blanket on some tree...

This is not the stuff of published writing—whether it's in the form of Hayden's official report, or in an old man's recollections, like Jackson's autobiographies. Although their accounts are useful and important, we also need to find and make more available yet unpublished accounts, like Peale's—accounts that remain in under-used archives and dusty attics. They will provide important personal stories, correct for published errors, exaggerations and omissions, and contribute to Yellowstone's on-going history for the *next* 125 years.

Endnotes

1. William F. Goetzmann, *Exploration and Empire: The Explorer and the Scientist in the Winning of the American West* (New York: W. W. Norton., 1967), 507–508.
2. Aubrey Haines, *Yellowstone National Park: Its Exploration and Establishment* (Washington: Government Printing Office, 1974), 102.
3. William Henry Jackson, *Pioneer Photographer: Rocky Mountain Adventures with a Camera* (New York: World Book Co., 1929), 198.
4. Ferdinand V. Hayden, Fifth Report: Preliminary Report of the United States Geological Survey of Montana and Portions of Adjacent Territories (Washington, Government Printing Office, 1872), 65.
5. Peale Journal, July 20, 1871 (Research Library, Yellowstone National Park).
6. Peale Journal, July 7, 1871 (Research Library, Yellowstone National Park).

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CHARLES C. ADAMS AND EARLY ECOLOGICAL RATIONALES FOR YELLOWSTONE NATIONAL PARK, 1916–1941

James Pritchard



AS AMERICA'S FIRST NATIONAL PARK, Yellowstone has long been the focal point for contentious public debate over federal resource management policies. Few such policies have been as hotly contested in recent years as what has come to be called "natural regulation"—a policy of letting ecological processes, such as fire, take their natural course within Yellowstone's boundaries. Critics of natural regulation, most notably Alston Chase in his 1987 jeremiad *Playing God in Yellowstone*, attribute this policy to "a new philosophy of nature" invented by "California cosmologists" in the 1960s. The sixties were, indeed, an era of shifting popular and scientific ideas about the environment and consequent changes in federal approaches to managing national parks. It is, however, a serious misreading of Yellowstone's history to suggest that ecological rationales emerged fully formed in the 1960s and then spread within National Park Service ranks like an insidious foreign plant species. Such ideas, in fact, had been the subject of study and discussion among park managers and scientists for many decades. Charles C. Adams, an early twentieth-century animal ecologist, conceived a scientific rationale for Yellowstone in the 1920s, arguing that the park preserved "natural conditions" and thus enabled scientists (and the public) to observe nature's processes free from human intervention. An examination of Adams's work demonstrates that the idea of Yellowstone as a place to preserve natural conditions has been a powerful and enduring theme in the park's history.

During the first two decades of the twentieth century, scientists influenced park development by participating in the movement for national park standards, and by advocating the preservation of natural areas. Charles Christopher Adams was an instrumental member of the movement to protect "primitive conditions" in national parks. Arriving from Harvard at the University of Chicago in 1899, Adams studied under Charles B. Davenport, Henry C. Cowles, and Charles Otis Whitman. He worked as a curator at the University of Michigan's Natural History Museum while completing his Ph.D., awarded in 1908. From 1908 to 1914, he served as a professor in animal ecology at the University of Illinois. In December 1914, he participated in the initial organizational meeting of the Ecological Society of America (ESA),

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along with Victor Shelford, Henry C. Cowles, and others. The ESA named Adams its president in 1923.¹

In 1913, Adams's *Guide to the Study of Animal Ecology* discussed the importance of ecological investigations, pointing out that experts in taxonomy traditionally designed the surveys employed by museum expeditions and for analysis of fishery resources. Economically useful lists resulted, but these were of limited use for discovering relationships among animals. A descriptive element was essential in ecology, yet the scientist must do more than collect specimens, also gathering "observations on the habits, activities, interrelations, and responses of animals."² Ecological surveys needed to be developed in a deliberate manner. Adams was self-consciously splitting away from natural history traditions as he helped create the field of animal ecology.

For Adams, fieldwork was essential to ecology. He repeated the question posed by William Keith Brooks in 1899: "Is not the biological laboratory which leaves out the ocean and the mountains and meadows a monstrous absurdity?"³ Adams thought answers to important questions would be found not in the laboratory but in the field. Ecologists must not simply gather data, but learn to habitually "study in the field."⁴ By this he meant thinking, endlessly mulling over facts and observations: field data helped the ecologist to arrive at the ultimate aim, "the *interpretation* of the responses of animals to their complete environment."⁵

The work of Charles C. Adams gave the National Park Service (NPS) scientific reasons to protect the "primitive" character of its landscapes. While use of the term "primitive" over time seemed to yield to the word "original" and finally to "natural," the terms were interchangeable through the early 1930s as scientists and conservationists discussed the conditions they aimed to preserve in the parks. Adams urged scientists to conduct ecological surveys to record animal "associations, their interrelations and responses to their environment—before they have become too much changed or exterminated."⁶ Adams suggested that saving every type of environment might not be possible, but he felt it important to at least record for posterity the ecological relationships. Adams sought a study of "original conditions," which were vanishing with each succeeding generation.⁷ He wondered "if the naturalists of the future will commend our foresight in studying with such great diligence certain aspects of biology which might be very well delayed, while ephemeral and vanishing records are allowed to be obliterated without the least concern."⁸

Adams was not alone in his concern about preserving natural conditions in park landscapes. In 1916, Joseph Grinnell and Tracy Storer, scientists at the University of California's Museum of Vertebrate Zoology at Berkeley, published "Animal Life as an Asset of National Parks" in the journal *Science*. Their thoughts about the national parks reflected some of the latest ecological thinking, but also revealed how natural history traditions and cultural baggage limited conservation practices.

To "realize the greatest profit" from parks' native animal and plant life, wrote Grinnell and Storer, "their original balance should be maintained." Dead trees should not be cut down, because they "are in many respects as useful as living" ones: woodpeckers which riddled the living trees of destructive insects found sustenance as well as nesting sites in standing dead timber. They considered downed timber also

essential in maintaining a “balance of animal life,” for decaying logs provided homes for mice and thus supported hawks, owls, fox, and marten. Undergrowth or thickets should not be destroyed in parks any more than necessary because they provided “protective havens” as well as berries for birds, squirrels, and chipmunks. Non-native species, they thought, should be excluded from the parks: “In the finely adjusted balance already established between the native animal life and the food supply, there is no room for the interpolation of an additional species.” The well-known example of the English sparrow proved this point—that introduced species often competed so well that they displaced native species.⁹

Grinnell and Storer saw the predator situation very differently from the NPS Ranger Division and the Bureau of Biological Survey. The Berkeley scientists advised that predators in the national parks be allowed to “retain their primitive relation to the rest of the fauna,” even if they levied a considerable annual toll on the other native animal life. These naturalists were convinced that prey species, such as mice and squirrels, had adjusted themselves to regular predation by carnivores. Like many other naturalists of their time, Grinnell and Storer thought of predatory animals such as marten, fisher, fox, and golden eagle as “exceedingly interesting members of the fauna.”¹⁰ In the context of 1916, “interesting” meant that the animal was of considerable scientific curiosity because naturalists knew very little about the species.

Grinnell and Storer argued for an absolute prohibition against hunting or trapping any wild animals in the parks. The principle was simple: “The native complement of animal life must everywhere be scrupulously guarded,” especially along roads where the animal life was most likely to be seen by visitors, and thus had the “highest intrinsic value from an esthetic viewpoint.”¹¹ Grinnell and Storer equated park predator control with the destruction of natural balance, and they offered an attractive esthetic justification for nature preservation.

Yet their willingness to entrust nature with the balance had limits. Nature might be adjusted, they suggested, to present the animal life of a national park at its best to the human visitor. Managers might increase native berry-producing plants, especially in the vicinity of camps and buildings, making up for thickets destroyed in building and road construction, allowing visitors to see a greater variety of bird life. They thought that local feeding stations during tourist season would not alter natural conditions “in any serious degree.”¹² Their emphasis on the localized control of predatory birds in order to create roadside venues for bird watching demonstrates their conviction that naturalists might control nature, carefully arranging the wildlife for display.

Adams helped spark a larger movement in the Ecological Society of America. In 1917, ESA President Ellsworth Huntington appointed Victor Shelford to head a new Committee on Preservation of Natural Conditions for Ecological Study, which functioned through 1946. By 1921, the committee identified nearly six hundred natural areas, many of them in the national parks, that deserved preservation. Emphasizing scientific rationales over recreational and aesthetic reasons for preservation, the committee advocated “An Undisturbed Area in Every Natural Park and Public Forest.” By 1921, about ten percent of the ESA’s membership

enthusiastically joined the committee, which during the 1920s fought irrigation schemes in the national parks, including one intended for the Bechler Basin in southwestern Yellowstone. Scientists were concerned that logging and hunting were one step behind, forever changing the original conditions found there. Other organizations such as the National Research Council signed on to the campaign to preserve natural conditions. A widely noted public statement of scientists on the subject came in 1921, when the American Association for the Advancement of Science passed a resolution opposing the introduction of exotic plant and animal species into the parks. Significantly, the resolution opposed “all other unessential interference with natural conditions.”¹³

Barrington Moore, editor of the journal *Ecology*, joined Adams and Shelford in publicizing the need for preserving natural conditions in the national parks. In the Boone and Crockett Club's 1925 publication *Hunting and Conservation*, Moore explained the scientists' case for preserving parks in a natural state. People must see conservation in the broadest sense, wrote Moore, where the object was putting every acre of land to its “highest use.”¹⁴ National parks were important for recreation, but they also offered an opportunity to study plant and animal life “in their natural surroundings.”¹⁵ Moore argued that scientists were becoming less satisfied with collecting and identifying, wanting instead to pursue new studies in heredity and environment. Laboratories were necessary but not sufficient; studying in nature's workshop would enable investigation of evolution and adaptation firsthand.

Despite his recognition of a constantly evolving world, Moore also saw a balance of nature. Investigating this balance made national parks important to science, thought Moore, as the parks increasingly represented the last undisturbed places. He argued that the “processes of nature are so delicately adjusted” that when people interfered with nature the results were entirely unpredictable.¹⁶ In America, Moore thought, species of animals had gone extinct precisely because people had upset the balance of nature by introducing non-native fish and game animals to forests and parks, and by removing dead trees.

Not only scientists, but national park advocates as well spoke out on behalf of primitive nature in the parks. The National Parks Association (NPA), established in 1919, utilized the idea of preserving “primitive” conditions through the early 1930s in its language and view of the parks' purpose. Robert Sterling Yard was associated with the National Park Service from its inception. When Stephen Mather came to Washington to take charge of the new bureau, he brought Yard at his own expense to serve as the agency's publicity director in Washington. An experienced journalist, Yard wrote articles that brought favorable publicity to the parks. With Mather, Yard established the NPA, but soon friction developed between them.

Yard's ideal vision of the parks was embodied in his campaign for “National Park Standards,” an effort to restrict the national park designation to landscapes of national interest. Yard's standards defined the parks as large landscapes that essentially maintained their “primeval” state, superior in quality and beauty, lands deserving preservation for people's education, inspiration, and enjoyment. The NPA suggested that parks should be “a sanctuary for the scientific care, study, and preservation of all wild plant and animal life within its limits, to the end that no species shall become

extinct.” The NPA urged that “wilderness features” in parks “be kept absolutely unmodified.” Finally, National Park Standards urged that “sanctuary, scientific, and primitive values must always take precedence over recreational or other values.” Thus during the 1920s, the NPA saw not only the danger of industrial intrusions into the parks, but already worried about the proper balance between use and preservation.¹⁷

Charles C. Adams remains central to this story because he served as an early connection between ecology and the National Park Service, contributing to science in Yellowstone in a very direct fashion. In 1919, Adams helped establish and became the first director of the Roosevelt Wild Life Forest Experiment Station, located at New York State University’s College of Forestry in Syracuse. Professor Alvin Whitney, Adams’s colleague at the School of Forestry, operated a Boy’s Forest and Trail Camp from 1921 to 1923 in Yellowstone. Although the camp ended up a financial bust, it provided the first connection between Yellowstone and the Roosevelt Experiment Station. Field parties began to journey from Syracuse to Yellowstone National Park, establishing their headquarters at Camp Roosevelt near the junction of the Yellowstone and Lamar Rivers.¹⁸

The Roosevelt Experiment Station supported several of the earliest scientific studies of wildlife in Yellowstone. In 1922, Edward R. Warren published an article on “The Life of the Yellowstone Beaver,” while Richard A. Muttkowski’s study on the food habits of Yellowstone trout appeared in the *Roosevelt Wild Life Bulletin* in 1925. Edmund Heller, a staff member of the Museum of Vertebrate Zoology and co-author (with Theodore Roosevelt) of a book about African wildlife, turned his talents to a study of big-game animals in Yellowstone in 1925.

While some contributors to the *Bulletin* visited Yellowstone only briefly, Milton P. Skinner spent much of his professional career associated with the park, working as Yellowstone’s first park naturalist from 1920 to 1922. Skinner then secured an appointment as one of two Roosevelt Field Ornithologists. He was promoted to Roosevelt Field Naturalist in February 1924.¹⁹ In 1925, his voluminous study on Yellowstone’s birds appeared in the *Roosevelt Wild Life Bulletin*, and in 1927 Skinner wrote a prescient article on predatory and fur-bearing animals of the park for the journal.²⁰ In 1925, he also published *Bears in the Yellowstone*. A veteran of many days in the field, Skinner had observed the bears enough to make detailed comments on their food habits, information that became important during the 1970s when biologists questioned the dependency of bears on park garbage dumps. Bears, noted Skinner, ate roots and bulbs in the spring, berries at the end of summer, pine cones, timber ants, termites, “fat juicy grubs,” indeed “practically everything edible.”²¹

In 1926, Adams became preoccupied with his new position as director of the New York State Museum in Albany, busy with work on the American Society of Mammalogists’ Committee on Wild Life Sanctuaries, and engaged with the ESA Committee for the Preservation of Natural Conditions. The Roosevelt Wild Life Experiment Station did not sponsor additional projects in Yellowstone, although it pursued studies in New York and published its *Bulletin* until 1941. Even though the station’s staff performed investigations in Yellowstone for a relatively short time span, they performed some of the earliest significant ecological science in the park.

There were limits, of course, on how much the idea of preserving natural

conditions affected NPS management practice during the 1920s. Yellowstone's creation owed much to the influence of railroads, and their interest in promoting tourism set precedents for the park. National Park Service Director Stephen Mather also emphasized tourism development to build a popular base of support for the bureau. Defending the national parks from commercial development meant encouraging park use. Yellowstone Superintendent Horace Albright never fully embraced Adams's notion of preservation to protect an unmodified nature. Pragmatically, he protected and manipulated animal populations with the intention of providing tourists with the opportunity to see abundant wildlife.

Yet the connection between Adams and Yellowstone laid a foundation for later thinking about what the parks could protect and preserve. The idea of preserving natural conditions influenced Yellowstone's wildlife management in significant ways. During the 1930s, national parks stopped controlling predators. Shortly after World War II, Yellowstone dismantled its bison ranching facilities to present wild animals in their natural setting. Park administrators closed the bear feeding platforms with the idea of eliminating the most garish zoo-like features of the park. To preserve a "natural" range, Yellowstone rangers began a systematic program of transporting (and eventually slaughtering) "surplus" elk in the 1920s. Since the late 1960s, however, park biologists have questioned prevailing ideas about what a rangeland should look like in a natural condition. Today, Yellowstone no longer sponsors a fish hatchery that artificially augments sport fish populations.

Not only scientists, but tourists and philosophers still look to the national parks as places where nature proceeds according to its own rhythm. The Yellowstone ecosystem, despite the limits our culture and our past place upon it, remains "one of the largest, essentially intact, wild ecosystems remaining in the earth's temperate zone."²² As Charles C. Adams hoped, it remains one of the last places where biologists can watch functioning natural systems with most of their original complement of animals and plants, largely unaffected by human manipulation. The reintroduction of the wolf represents a major step in recreating the natural conditions Adams wanted to preserve. We sometimes think of nature preservation in the parks as the direct descendent of aesthetic preservation. In fact, a complex interaction among cultural movements, ideal notions about how nature works, changing conservation strategies, scientific information, institutional structures and a dash of politics have informed and shaped park policies. Scientists, including Adams, proposed during the early twentieth century that Yellowstone serve as an ecological control. This has endured as one of its most significant purposes, underlying both management and public understandings of nature in Yellowstone.

Endnotes

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A PUBLIC FACE FOR SCIENCE: A. STARKER LEOPOLD AND THE LEOPOLD REPORT

Kiki Leigh Rydell



IN 1963 A GROUP OF SCIENTISTS AND WILDLIFE EXPERTS authored a report—subsequently, and more commonly, referred to as the Leopold Report—to help the National Park Service manage its wildlife. While the Leopold Report reflected in broad terms the scientific thinking of wildlife biology in the 1960s and, in a narrower sense, some of the ideas put forth by previous park service critics, it bore the unmistakable imprint of its primary author, Aldo Starker Leopold. Son of conservationist and wilderness advocate Aldo Leopold, Starker Leopold was at the time a wildlife biologist at the University of California in Berkeley. The report is a prime example of Starker Leopold's particular expertise: his uncanny ability to translate biological ideas into public policy.

The Leopold Report developed logically, or naturally, from Starker Leopold's earlier thinking about nature. As eldest son of Aldo Leopold and member of the Leopold family—all of whom shared a deep and enduring love for and scientific interest in the outdoors—Starker found a natural and comfortable place in wildlife biology. He brought to the discipline a love for hunting and fishing and a inquisitive mind that was forever searching for ways to understand the natural world.

Starker's early years were spent on the Rio Grande River and in the oak and prairie country around Madison, Wisconsin, hunting and fishing with his parents and siblings. From an early age he kept a hunting journal in which he recorded—clearly and systematically—the conditions and count (or bag) of the day.¹ He and his father were very close and they shared insights about nature and wildlife habits. When Aldo's classic text *Game Management* was published in 1933, he gave Starker a copy for Christmas and inscribed it with these words: "The materials for this book were gathered from the four winds, but the conviction that it should be written comes largely out of our trips together on the Rio Grande."²

After completing his undergraduate studies at the University of Wisconsin, the younger Leopold followed his father's footsteps to Yale Forestry School in 1936 but decided in 1937 to continue his graduate work at the University of California and work with zoologist Joseph Grinnell.³ After his first term at Berkeley, he took what was to be a very important field trip with his father: For a month in the winter of 1937, he hunted in the Mexican wilderness of the Rio Gavilan. The trip had a

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profound impact on Starker's wilderness and wildlife ecology education. "[The trip] gave me my first real look at an honest-to-god wilderness, an ecosystem unaltered by any livestock or people," he commented forty-five years later. He was especially taken with the role fire played in keeping the land "healthy." "It began to dawn on me that fire was a perfectly normal part of that sort of semi-arid country, and might even be an essential part of it." Leopold was also struck by the natural and apparently beneficial role predators played in this healthy landscape. "There was a tremendous crop of deer," he remembered later, "but not too many because there was also a big crop of mountain lions and wolves, both of which were killing the deer."⁴

Leopold did research for his dissertation on "The Nature of Heritable Wildness in Turkeys," while working for the Missouri State Conservation Commission and wrote the dissertation in the fall of 1943 while living with his parents. He successfully defended his dissertation in the spring of 1944 and it was well received by most biologists. One source of criticism came from a University of Chicago biologist, Joseph Hickey, who favored rigorous quantitative analysis over natural history. Leopold took no heed of Hickey's criticism and he would never belong to the group of wildlife biologists calling for rigorous quantitative analysis to replace factual description based on careful observation.⁵

For two years after graduation, Leopold worked in Mexico collecting the field data on Mexican wildlife he would later include in his award-winning book *Wildlife of Mexico* (1959), a natural history of true Leopoldian proportions.⁶ In 1948, soon after his father's death, Leopold returned to the Mexican wilderness of the Rio Gavilan area he had visited a decade earlier. He had planned to collect specimens



Figure 1. A. Starker Leopold hunting chukkar partridge in the Tremblor Range, San Luis Obispo County, California, 1955. Photograph by Eben McMillan, courtesy of James McMillan.

and “initiate some long-term studies of the native fauna under virgin conditions.”⁷ But instead he found that civilization had invaded the wilderness: lumber trucks, new roads, and grazing stock littered the landscape. “We knew then,” he wrote in a piece for a popular journal, “that instead of initiating an era of renewed acquaintance with the wilderness, we had come to witness its passing.”⁸ Leopold returned from the trip determined to preserve wilderness: “Must there be a cow on *every* hill and a road in *every* valley?” he asked.⁹ And he returned with a deepening awareness of the complexities of the predator-prey relationship. Just how much should predators be controlled before the “natural balance between predator and prey” was disturbed, he pondered.¹⁰

Leopold was hired by Alden Miller, who replaced Joseph Grinnell as director of the University of California’s Museum of Vertebrate Zoology, to fill a new position at the museum in “Wild Life Conservation.” In particular, Miller wanted Leopold to provide “leadership in research and public relations in this field for the Museum.”¹¹ Leopold rose quickly through the ranks, becoming, in 1958, Miller’s assistant director of the Museum of Vertebrate Zoology. Miller recognized and appreciated Leopold’s practical bent and approach to wildlife management issues. Leopold became known, in fact, for his expertise in “human affairs” and for his ability to synthesize scientific ideas and then translate them into political and lay terms.¹² These skills and a decade of experience handling hot topics—such as deer management and fire and predator policy—prepared him well for the role he would play as advisor to Secretary of the Interior Stewart Udall in the 1960s.

In the early 1950s Leopold presided over a group of wildlife biologists studying deer management in California. In his capacity as director of the project, Leopold was primary author of the two ensuing reports and the primary recipient of the criticism that arose when recommendations were made. The deer irruptions, Leopold argued, were the result of poor management. “Chronic undershooting, often coupled with unnecessary predator control, has permitted countless local irruptions of varying degrees of severity—an unexcusable [*sic*] waste of game and range resources as well,” he wrote. Just as the problem with irruptions lay with wildlife and range management, the remedy for irruptions, according to Leopold, also had a *management solution*. In particular, Leopold recommended “deliberately and purposefully manipulating plant successions to maintain high range capacities for deer” and liberalizing the hunting regulations—to include doe hunting—for full harvesting of the annual deer crop.¹³ Especially with this last point, Leopold’s recommendations raised the roof. To put it mildly, doe shooting was highly unpopular. But Leopold did not shy away from what he thought was good science for the sake of popularity. “Let me make this clear at the outset,” he argued forcefully in a piece for the popular press, “there is no controversy over deer management among those who have studied the animals in the field. The controversy is among those who study the problem beside a pot-bellied stove or in a smokey conference room.”¹⁴

Another issue Leopold took on in the 1950s was fire policy and controlled burning. In 1957, Leopold presented a paper at the Fifth Biennial Wilderness Conference entitled “Wilderness and Culture.” In this talk, he tackled the issue of fires in wilderness areas, especially national parks. “There is still one striking

exception in the trend toward naturalness in park preservation,” he observed: “the complete exclusion of fire from all areas, even those that burned naturally every year or two before becoming parks.” “I am convinced,” he continued, “that ground fires some day will be reinstated in the regimen of natural factors permitted to maintain the parks in something resembling a virgin state. Both esthetic considerations of open airy forest versus dense brush, and assurance of safety from conflagration of accumulated fuel will force this issue sooner or later.”¹⁵ In an interview almost thirty years later, Leopold described the park service personnel attending the conference: “[O]ut of the corner came the old-time Park Service boys,” he related. “Harold Bryant, who was one of the old timers, stood up, and he was shaking he was so mad. And he made me mad when he started out and said, ‘I am amazed that the son of Aldo Leopold....’ And boy that really set me off.”¹⁶ As with the deer management issue, Leopold did not budge, predicting—correctly—that allowing fires to burn would become part of park policy “sooner or later.”

Leopold gave a great deal of thought to the idea of wilderness. He was a strong supporter of wilderness areas for their scientific as well as esthetic value. Anticipating his work in the 1960s on national park policy, Leopold advocated in 1955 that wilderness areas be managed to “stimulate original conditions as closely as possible.”¹⁷ As part of his management strategy, Leopold applied his ideas on the importance of fires to a healthy ecosystem. “As a matter of policy in preserving natural areas *we are going to have to accept responsibility* for...controlled experimentation with fire,” he wrote in a professional paper.¹⁸

As with deer management and fire-control issues, Leopold did not do any original research in the area of predator–prey relationships. Rather he synthesized the material from the research of others and more importantly brought it to the attention of the public. He was a public educator *par excellence*. In 1954, he presented a paper to the National Association of Biology Teachers on the ecology and economy of predation, in which he argued that instead of rebuking predation, humans should consider it an advantageous way to limit surplus individuals because, as he put it, predation “cleanly eliminates some individuals without impairing the vigor and health of the survivors.” “Alternate controls such as starvation, disease, and intra-specific bickering,” he continued, “impose a drain on all members of a population, leaving survivors weakened in body or spirit” by the loss of food or social intolerance.¹⁹

At this point it is important to remember that Leopold was a wildlife biologist–manager and not purely a biologist. His work had a very practical side: learning about wildlife systems so these same systems could flourish. His particular expertise came not so much from his own science *per se* as from his ability to take scientific ideas into a public arena and stand up for them with eloquence and authority.

During the 1950s, Leopold worked together with British naturalist Frank Fraser Darling on policy recommendations for managing Alaskan wildlife populations. To manage well and fully utilize the big-game herds of Alaska, Darling and Leopold advocated habitat preservation by “deliberately controlling two of the principal influences on range conditions—fire and numbers of grazing animals.”²⁰ The key to the success of the wildlife resource was management—management based on sound policies. The bone the biologists chose to pick with the agencies managing Alaska’s

wildlife resources was “the inadequacy of present policy.”²¹ Leopold’s concern for policy issues and his readiness to take up a position as advisor to the government on management concerns anticipated his involvement in wildlife resource policy in the 1960s.

Leopold worked on a number of projects on a variety of wildlife and conservation issues throughout the 1960s. Most continued work started at least conceptually at an earlier date. His publications, while never at the scientific center of the burgeoning field of wildlife ecology, now veered even further from the cutting edge of primary research and turned to public policy work based on secondary sources. This is not to say that Leopold became more theoretical; he, in fact, held fast to his practical bent. Nor is it to argue that he left his field boots behind for a comfortable armchair position from which he could reflect peacefully on uncontroversial wildlife principles. While he donned his field boots less frequently for research and more for policy studies, Leopold became deeply embroiled in some of the hottest wildlife issues of the decade. More than involved, Leopold moved to the center of the storm over national park wildlife policy, predator control, and wildlife refuge definition.

When, in 1962, Secretary of the Interior Udall called on Leopold to serve as chair of his Special Advisory Board on wildlife matters, Yellowstone Park was in a state of crisis. Park service employees were implementing a two-pronged policy to restore some sense of “balance between Yellowstone’s animal populations and their environments”: first, reduction of elk herds on the northern range of the park and second, the education of the public about the need for such massive killings. Neither prong was developing smoothly: vociferous complaints about the reduction continued.²² Leopold was well aware of his board’s assignment. “It is acknowledged,” he wrote in the report, “that this Advisory Board was requested by the Secretary of the Interior to consider particularly one of the methods of management, namely, the procedure of removing excess ungulates from some of the parks.”²³ Familiar with the questions of management his committee would have to address, he knew the report would be in the limelight of a heated wildlife management debate.

The report provided Leopold with the opportunity to air in public many of the ideas he had been grappling with for years: the ecological necessity of both fires and predators, and the importance of habitat maintenance for healthy wildlife populations. “I really worked long and hard on that [report],” he later remembered. “I got in a lot of the ideas that had been brewing in my mind for a long time.”²⁴

He also saw the report as a real opportunity to influence wildlife policy nationally and even internationally. As he put it “the world was looking at us.” “If,” he told one listener, “we were to recommend public hunting of elk, parks in Africa would feel pressed to permit the public hunting of elephant. We decided that we would develop a philosophy of management that could be applied universally.”²⁵ With such a serious mission at stake, Leopold did not shy away from advocating an unpopular position on issues of park management. As he later told one interviewer: “I figured, ‘Okay, I’m in my career here; I can say any damn thing I want.’”²⁶

The Leopold Report advocated continuation of the park service’s policy of elk reduction as part of its idea of “purposeful management of plant and animal communities as an essential step in preserving wildlife resources ‘unimpaired for

the enjoyment of future generations.”²⁷ Other management methods could include reintroducing native species and allowing fires and other natural controls such as predators to curb explosive populations. “Of the various methods of manipulating the vegetation,” he wrote in the report, “the controlled use of fire is the most ‘natural’ and the easiest to apply.”²⁸ Leopold received criticism from several directions for his position on both fire as a management tool (some environmentalists initially opposed this idea) and continued park service reduction of “excess” ungulates (obviously many hunters opposed this idea).²⁹

It is especially interesting to watch Leopold mature as a wildlife biologist with respect to the issue of public hunting in the park. Pressure to allow public hunting from the sporting side of the wildlife management field must have been tremendous. Even one of his colleagues on the Special Advisory Board—Thomas Kimball—supported this position. Kimball referred to the excess elk that he and other committee members observed in the park as part of their research as excess “game,” for example.³⁰ But Leopold came out firmly opposed to the idea.³¹ The parks’ “primary purpose...is not public hunting,” he argued. If one traces Leopold’s own growth as a wildlife biologist it comes as no surprise that he felt so strongly about this issue. While he remained an avid hunter, Leopold by the 1960s had developed a philosophy of wildlife management that was quite different from his previous philosophy. In earlier decades, producing a crop for hunting had been the primary purpose of wildlife management for Leopold. According to the more mature Leopold of the 1960s, however, wildlife existed not just to be harvested, but also to be viewed.

As trained wildlife biologists, he told an audience of students, “we must take a broader view of our objective than the narrow and rather specific one in which I emerged as a young wildlife biologist, namely that we’re producing a crop for hunting....[T]hat is only a part of our total responsibility.”³² Of equal weight, according to Leopold, was “wildlife management for its aesthetic values.”³³ Thus while the values of hunters—and those in wildlife management who believed that hunting was the main reason to preserve wildlife populations—remained important to Leopold, they were not the defining parameters within which all wildlife management decisions should be made.

When it came out, the Leopold Report received for the most part high marks from the biological and wildlife management community. Its two main recommendations—continued ungulate reduction and management of the parks according to scientific principles to restore and preserve wildness—rested on comfortable premises for most wildlife biologists. The ungulate reduction proposal, while politically controversial and difficult for many hunters to accept, was scientifically in accordance with the ideas of the time. One scientist, for example, wrote to the associate superintendent of Yellowstone shortly after the report came out: “I found their conclusions to be very encouraging. It is interesting that the conclusions reached by all persons who examine your problems objectively are essentially the same.”³⁴ Another comment—made to Leopold directly this time—came from Charles Piersall of the Izaak Walton League: “I consider your report to be the most factual and scientifically arrived at that I have ever read on the subject....I accept the report because of the fact that the individual

members of the Advisory Board have visited and personally experienced the varied climatic and topographical conditions contributing to the Northern Yellowstone elk situation, and at the same time weighed and evaluated the scientific data compiled by other competent biological and ecological authorities.”³⁵ While elk reduction was halted—for political reasons—a few years after the report came out, Leopold’s position on the issue did not waver and was never really at odds with the scientific community.

While most biologists—Leopold included—had some difficulty with his recommendation to manage the parks to maintain or restore “primitive” biotic associations, the issues were not unusual ones for biologists to be grappling with in the 1960s. Leopold based the recommendations of his committee on a report issued by a committee of the First World Conference on National Parks entitled “Management of National Parks and Equivalent Areas.” This report advocated managing national parks based on scientific research to maintain “biotic communities in accordance with the conservation plan of a national park.” Management, for this committee—as for Leopold’s committee—could involve “active manipulation of the plant and animal communities, or protection from modification or external influences.”³⁶

Some might argue that Leopold did not have a realistic appraisal of ecological relationships if he could advocate trying to restore or maintain *a* particular biotic association. But Leopold’s ecological sense was not out of line for his time. And he knew that there were limitations to what scientists at that or any time could accomplish. “In essence, we are calling for a set of ecologic skills unknown in this country today,” he acknowledged.³⁷ And he felt that he took ecological principles into account when he made his recommendations. For example, Leopold recognized the difficulty of dealing with ecological communities when he told the park service that “A reasonable illusion of primitive America could be recreated, using the utmost in skill, judgment, and ecological sensitivity.”³⁸ What Leopold really wanted was for the park service, as he put it, to “recognize the enormous complexity of ecologic communities and the diversity of management procedures required to preserve them.”³⁹

What Leopold feared was a policy of overprotection instead of active management. “Reluctance to undertake biotic management,” he wrote, “can never lead to a realistic presentation of primitive America, much of which supported successional communities that were maintained by fires, floods, hurricanes, and other natural forces.”⁴⁰

Adolph Murie, the well-known naturalist on the staff of the National Park Service, was so pleased with the report that he hesitated to, as he put it, “make any comments that deviate from full agreement.” But comment he did. Protection was what the parks needed, not management. “I believe,” he wrote in a review of the report for *Living Wilderness*, “that our attitude should be to protect parks with the minimum necessary management.” After offering a hint of criticism, Murie backed off and chalked it up to “phraseology.” “My comments,” he conceded, “are in great part a matter of different phraseology. I am certain that fundamentally there is agreement that our national parks should be preserved in a natural state, as free as possible from all intrusions and manipulations.”⁴¹ But he did take issue with the

idea of maintaining “biotic associations within each park...as nearly as possible in the condition that prevailed when the area was first visited by white man.”⁴² Natural conditions cannot be “maintained,” Murie argued correctly. Change, as Leopold well knew, is an integral part of any natural community. “This goal,” complained Murie, “suggests that we freeze the environment at a certain primitive stage. This implies a static condition. Although the committee may not have meant this, it has been so interpreted and accepted by some administrators.”⁴³

Bob Linn, who as a park service employee was responsible for implementing the Leopold Report, also “realized” this major “flaw” in the Leopold Report. “[T]he statement as written,” Linn wrote years later, “implies that an ecological condition can (and should) be frozen in time.” When Linn and his colleagues came up with a more ecologically correct expression of the same idea, the Leopold committee, according to Linn, responded by declaring: “Of course that’s what we meant.”⁴⁴

Conservationists and biologists applauded Leopold’s recommendations for minimizing artificiality and human intrusions. “We urge the National Park Service to reverse its policy of permitting...non-conforming uses,” Leopold wrote for his committee. “Above all other policies, the maintenance of naturalness should prevail,” he wrote.⁴⁵ Such recommendations were considered “inspired” and “startling” by conservation journals. Bruce Kilgore wrote the following for the *Sierra Club Bulletin*: “The Leopold Report is one of the most significant reaffirmations of national park policy since the establishment of the National Park Service....[T]he great significance of this report is that it sets forth at an extremely high political level the basic ecological principles which Muir, Olmsted, Leopold, the Sierra Club, and others have been urging down through the years.”⁴⁶

Many of the ideas in the Leopold Report were not new to the park service. Historians of the national parks have documented that biologists such as Joseph Grinnell and his students George Wright and Joseph Dixon had argued vociferously for management of the parks to preserve the primitive.⁴⁷ The reports issued by these biologists are clear testimony to their philosophical and scientific belief in the need to preserve the primitive. “The old phrase, ‘let nature take its course,’ applies rightly to National Parks, if to no other areas in our land,” wrote Grinnell to the superintendent of Yosemite in 1925. Nine years earlier Grinnell had written: “Herein lies the feature of supreme value in national parks. They furnish samples of the earth as it was before the advent of the white man.”⁴⁸ And in 1935, as part of the series *Fauna of the National Parks of the United States*, George M. Wright wrote: “Maintenance of wildlife in the primitive state is...inherent in the national-park concept.”⁴⁹

No doubt Leopold knew about the Fauna Series, for he had a copy of the series in his possession during his drafting of the report. No doubt he had done his homework before putting together his own report. And no doubt he shared their scientific perspective. He was, after all, Grinnell’s student and a product of the same philosophical tradition as George Wright and Joseph Dixon. That his report supports the findings and conclusions of the Fauna Series comes as no surprise.

It is clear that the Leopold Report reaffirmed ideas promulgated in the 1930s. But the impact the report had on park service policy was decidedly its own. While the words of Wright and others influenced a few biologists and concerned citizens,

the Leopold Report influenced public policy. In May 1963 Secretary of Interior Udall sent a memorandum to Conrad Wirth, director of the National Park Service. "The report of the Advisory Board on Wildlife Management of the National Parks...has been reviewed....You should, accordingly, take such steps as appropriate to incorporate the philosophy and the basic findings into the administration of the National Park System."⁵⁰ Five years later, the Leopold Report was incorporated into the "first [National Park Service] comprehensive policy manuals."⁵¹

What was so different about the Leopold Report was the context within which it was received. That the report was written in the environmentally conscious 1960s and that it was commissioned by the secretary of the interior meant that its message would get heard. The park service in 1963—unlike in the 1930s—seemed ready to listen to science.

Another angle from which to view the Leopold Report is how it indirectly helped resolve the dilemma posed by the park service's Organic Act—a dilemma recognized by Leopold's predecessors. "The conclusion," wrote George Wright in volume two of the Fauna Series, "is undeniable that failure to maintain the natural status of national parks fauna in spite of the presence of large populations of visitors would also be failure of the whole national parks idea."⁵²

By defining the "goals" of wildlife management in the parks as being to "represent a vignette of primitive America," Leopold joined the two primary functions of the park service: preservation of nature and use (or enjoyment) by people. Now the park service could comfortably argue that the use or enjoyment part of their mandate was dependent on the successful restoration of, as Leopold had written in the report, "a reasonable illusion of primitive America." Director Wirth picked up on this aspect of the Leopold Report. "The report provides an excellent framework within which to carry out the management and conservation of park resources," he wrote to Udall in August 1963. "The *use* objective should be stated in similar broad and long-range terms and in a way consistent with the conservation principle." He continued, "If we are to conserve parks as 'vignettes of primitive America,' it follows that the parks should be presented and *used* primarily as 'vignettes of primitive America.' This is to say, use should be such as to capitalize upon the distinctive qualities and special scientific, educational, and aesthetic values of these areas.... This is where our emphasis, in managing public use of parks, should be."⁵³

In this way Leopold took biological ideas—past and present, his and others—into the political arena. The report became policy, was to varying degrees enforced, and has remained a topic of discussion in numerous circles. According to Frederic Wagner, writing in *Wildlife Policies in the U.S. National Parks*, the report had a decisive influence on park service policy. First, "it strengthened NPS policy resolve to manage biological resources in the parks by focusing attention on preserving samples of ecosystems in the conditions that prevailed at the time of European contact." Second, its emphasis on active management was "incorporated into the 1968 natural-area policy manual." Third, "it made a firm case for a sound, scientific basis for park management and recommended a strong research program" in the National Park Service.⁵⁴ Leopold's abilities as a communicator helped him turn biological convictions into political realities.

Endnotes

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